

**TITLE** The Uses of the National Information Infrastructure in Providing Services to Small Industry, State and Local Governments, and Education in Rural Areas. Hearing before the Subcommittee on Science, Technology, and Space of the Committee on Commerce, Science, and Transportation. United States Senate, One Hundred Fourth Congress, First Session (Billings, Montana).

**INSTITUTION** Congress of the U.S., Washington, D.C. Senate Committee on Commerce, Science, and Transportation.

**REPORT NO** ISBN-0-16-052377-X; Senate-Hrg-104-370

**PUB DATE** 1 Oct 95

**NOTE** 80p.

**AVAILABLE FROM** U.S. Government Printing Office, Superintendent of Documents, Congressional Sales Office, Washington, DC 20402.

**PUB TYPE** Legal/Legislative/Regulatory Materials (090)

**EDRS PRICE** MF01/PC04 Plus Postage.

**DESCRIPTORS** \*Access to Information; Community Colleges; Delivery Systems; \*Distance Education; Educational Resources; Elementary Secondary Education; Hearings; Higher Education; Human Services; Internet; \*Public Policy; \*Rural Areas; \*Rural Education; Telecommunications; Tribally Controlled Education

**IDENTIFIERS** \*Access to Services; Access to Technology; Congress 104th; Montana; \*National Information Infrastructure; Telemedicine

**ABSTRACT**

The Senate Subcommittee on Science, Technology, and Space held a hearing in Billings, Montana, on rural America's access to the National Information Infrastructure (NII) and uses of NII in the provision of rural education and services. An Assistant Secretary of Commerce discussed the development of the Internet, problems in rural access to the Internet and other information technologies, a federal grant program that helps rural communities to gain such access, and the effects of deregulation on rural access. A researcher outlined the potential impact of technology on rural schools, including opportunities for new distance learning models, for new models of student learning, and for improving teacher development. A health services administrator described the Eastern Montana Telemedicine Network, which delivers specialist physician consultation through video conferencing, delivers mental health consultative services, offers continuing medical and higher education programming to rural communities, and provides community outreach and telebusiness opportunities to geographically isolated communities. The computer systems and telecommunications director at Salish Kootenai College discussed the problems of providing telecommunications technology to tribal colleges on American Indian reservations and related problems involving rural telephone cooperatives, inadequate telephone service, and obsolete laws governing the delivery of utility services. Representatives of communications companies discussed the potential role of NII in promoting rural development and delivering rural services, and the need for continued Congressional action to support telecommunications competition. (SV)

RC

S. HRG. 104-277

# THE USES OF THE NATIONAL INFORMATION INFRASTRUCTURE IN PROVIDING SERVICES TO SMALL INDUSTRY, STATE AND LOCAL GOVERNMENTS, AND EDUCATION IN RURAL AREAS

ED 396 898

## HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE

OF THE

COMMITTEE ON COMMERCE,  
SCIENCE, AND TRANSPORTATION  
UNITED STATES SENATE

ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

OCTOBER 1, 1995  
BILLINGS, MONTANA

Printed for the use of the Committee on Commerce, Science, and Transportation

U.S. DEPARTMENT OF EDUCATION  
Office of Educational Research and Improvement  
EDUCATIONAL RESOURCES INFORMATION  
CENTER (ERIC)



- ☒ This document has been reproduced as received from the person or organization originating it
- ☐ Minor changes have been made to improve reproduction quality
- ☐ Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

U.S. GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1995

20-632 CC

For sale by the U.S. Government Printing Office  
Superintendent of Documents, Congressional Sales Office, Washington, DC 20540  
ISBN 0-16-052377-X

BEST COPY AVAILABLE

RC 020659  
ERIC  
Full Text Provided by ERIC

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

LARRY PRESSLER, South Dakota, *Chairman*

BOB PACKWOOD, Oregon  
TED STEVENS, Alaska  
JOHN MCCAIN, Arizona  
CONRAD BURNS, Montana  
SLADE GORTON, Washington  
TRENT LOTT, Mississippi  
KAY BAILEY HUTCHISON, Texas  
OLYMPIA J. SNOWE, Maine  
JOHN ASHCROFT, Missouri

ERNEST F. HOLLINGS, South Carolina  
DANIEL K. INOUE, Hawaii  
WENDELL H. FORD, Kentucky  
J. JAMES EXON, Nebraska  
JOHN D. ROCKEFELLER IV, West Virginia  
JOHN F. KERRY, Massachusetts  
JOHN B. BREAU, Louisiana  
RICHARD H. BRYAN, Nevada  
BYRON L. DORGAN, North Dakota

PATRIC G. LINK, *Chief of Staff*

KEVIN G. CURTIN, *Democratic Chief Counsel and Staff Director*

---

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE

CONRAD BURNS, Montana, *Chairman*

LARRY PRESSLER, South Dakota  
KAY BAILEY HUTCHISON, Texas  
TED STEVENS, Alaska  
TRENT LOTT, Mississippi

JOHN D. ROCKEFELLER IV, West Virginia  
JOHN F. KERRY, Massachusetts  
RICHARD H. BRYAN, Nevada  
BYRON L. DORGAN, North Dakota

(11)

# CONTENTS

Hearing held on October 1, 1995 .....	Page 1
Opening statements of Senator Burns .....	1
WITNESSES	
Ereaux, James D., Director of Computing & Telecommunications, Salish Kootenai College, Pablo, Montana .....	26
Prepared statement .....	29
Ford, Laura D., Vice President-Public Policy, U.W. West Communications, Denver, Colorado .....	31
Prepared statement .....	37
Fulton, Kathleen, Senior Consultant With Issue Dynamics, Inc., Washington, D.C. ....	10
Prepared statement .....	15
Irving, Larry, Assistant Secretary of Commerce for Communications and In- formation, United States Department of Commerce, Washington, D.C. ....	3
Prepared statement .....	38
Poulos, William N., Manager, Technology Policy, EDS Corporation, Washing- ton, D.C. ....	48
Prepared statement .....	23
Wilson, Kristianne B., Vice President, Marketing and Regional Services, Dea- coness-Billings Clinic Health System, Billings, Montana .....	19
Prepared statement .....	51
[NOTE: Other material submitted for the record will be retained in committee files—Survey of Rural Information Infrastructure Technologies, U.S. De- partment of Commerce, National Telecommunications and Information Administration (NTIA).]	

# HEARING ON THE USES OF THE NATIONAL INFORMATION INFRASTRUCTURE IN PRO- VIDING SERVICES TO SMALL INDUSTRY, STATE AND LOCAL GOVERNMENTS, AND EDUCATION IN RURAL AREAS

SUNDAY, OCTOBER 1, 1995

U. S. SENATE,  
SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE  
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,  
*Billings, Montana*

The subcommittee met, pursuant to notice, at 2 p.m. at the Holiday Inn Plaza, Gallatin-Bitterroot Room, 5500 Midland Road, Billings, Montana 59101.

The Honorable Conrad Burns (chairman of the subcommittee) presiding.

Staff members assigned to this hearing: Louis C. Whitsett, staff counsel, and Timothy B. Kyger, professional staff member; and Patrick H. Windham, minority senior professional staff.

## OPENING STATEMENT OF SENATOR BURNS

Senator BURNS. We will call this hearing to order. This is the Subcommittee on Science, Technology, and Space of the Senate Committee on Commerce, Science and Transportation, and of course we cover Science, Technology and Space. And even though we are not involved in the communications bill per se, this hearing does have a lot to do with where we are going in that respect with the national highway, the information highway.

And because on this subcommittee so many times we talk about research and development, science and technology, where we should be going, and also what has taken up much of the time, of course, has been the issue of NASA and space.

I would like to welcome our witnesses here today, those who are interested, and the public who are here to listen to testimony of the subcommittee. Today our committee will be focused on looking as to how these new computer technologies we have been hearing about for the last few years might work to help folks in the State in Montana.

Politicians like myself have talked now for years about the benefits of the information revolution, what it will bring. Today we will hear from people who make use of these new applications every day and who actually rely on them.

In the information revolution, many may only be involved in its first phase, because here we know that we are living in the real

(1)

world. We are outside the beltway. We are using information and services already available on the Internet, and a myriad of other applications.

Today we have with us six, I think, outstanding witnesses, each of whom uses the Web and the Net each and every day. They will tell the subcommittee about some of the applications available now, and/or what will be available in the very near future to help those of us who live in a state that is probably as rural as any state in the Union, other than probably Wyoming.

Larry Irving is here today with us, who is the Assistant Secretary of Commerce for Communications and Information, also the Director of the National Telecommunications and Information Administration, or NTIA, as we call it. He will first give us a general overview of the current Internet and other coming so-called National Information Infrastructure, or NII.

We will hear from Kathleen Fulton today, Senior Consultant with Issue Dynamics, who will give us her perspective and her views of so-called "distance learning," using the NII and the Internet to teach our kids.

James Ereaux has been using distance learning techniques for the Salish Kootenai College to help provide education among the Native Americans living on our reservations.

Kristianne Wilson is with Deaconess-Billings Clinic here, and she will speak during the hearing on how they are using it in telemedicine, for those of us living here in the West where you might have to travel hundreds of miles to see a specialist. Otherwise, I think we can envision doing some activities with telemedicine.

Also, we just passed the telecommunications bill. I will just give you a little background and maybe a side story to it for those of you who are fortunate enough never to have to go into Washington, D.C. and try to follow everything that happens there, because there are some of us here that are still convinced that that is 13 square miles of logic-free environment that we work in there, and sometimes it takes a little bit of doing.

But I remember back in 1989, and I was probably not the person that would sit on the Commerce Committee and get interested in telecommunications or even science and technology, or even space. But when you take a look and see how all of these technologies apply to the state of Montana, it told me right away that we have some work to do here in the state of Montana, and that we are going to be doing things differently.

There are new technologies that we will be able to take advantage of. There are new businesses being created all the time, and some of those businesses created here in Montana. We have a very, very active school system, and even our University of Montana and Montana State University are now forging to the front in business learning and applications of new technologies in order to enhance not only the opportunities for our young people in the state of Montana but also all over this country.

So with that, I want to say welcome. I think you will get something from this hearing. We will have some questions, and then we will take comments from the public. If you have questions of any

of the witnesses, we will also take those questions and try to get some answers for you.

So with that, I want to introduce Larry Irvin, or Irving, I guess it is, or whatever, Irving. I have only known him ever since I have been in Washington. He was on the Commerce Committee staff when I first went there.

I can remember the day when I offered the amendment for video dial tone and telcos going into the cable business, and everybody thought we had lost our marbles, and we had there for a little while. Nonetheless, I was a junior member going on the committee and starting the ball rolling maybe to innovate or to create a debate, to start the debate on how we are going to allow these new technologies to flow. And we know that if you deregulate a little bit, there are a lot of things that can happen in the private sector.

So with that Larry has been, and I have used him, a source of information. Also, with his experience on the Washington scene, he has a very practical experience in this area of telecommunications.

So Larry, we appreciate your coming up. Welcome to Montana, and we will be interested in hearing from you at this time.

**STATEMENT OF LARRY IRVING, ASSISTANT SECRETARY OF  
COMMERCE FOR COMMUNICATIONS AND INFORMATION,  
UNITED STATES DEPARTMENT OF COMMERCE, WASHINGTON, D.C.**

Mr. IRVING. Thank you, Mr. Chairman, and thank you in particular for inviting me to come out to Montana. It's my second trip to Montana. The last time I was a lot younger, I had hair, and the hair I had wasn't gray, out in Butte when I was in law school, and it is a pleasure to come back to Montana, and a particular pleasure to present our testimony at this hearing.

We have been trying during the last 2 years of the Clinton Administration to help build an information infrastructure, and to build it with the private sector. We know that there are benefits for small businesses, state and local governments, education and health care, and we know that this information infrastructure has particular importance for rural areas.

When you have a president from Arkansas and a vice president from Tennessee, they focus a lot on rural areas.

And even though I'm from Brooklyn and don't know a lot about rural America, I have tried to learn over the last several years.

What we're talking about when we talk about the NII is connecting people, one to another, to services and to information. Getting connected to the Information Age will bridge geographic barriers, promote access to educational opportunities, improve the community's ability to attract business and economic development, will improve the quality of life and increase productivity.

3.6 million Americans work in the telecommunications and information industries today, and millions more are affected by these technologies. And while telecommunications and information technologies are about 1/10th of our gross domestic product today, scheduled to go to 20 percent over the next decade, it's not just the telecommunication and information industries that stand to benefit from this information superhighway.



Whether you're a mechanic in Helena, a farmer on the Powder River or a small business owner in Billings, use of computers or increased computer literacy improves your economic performance. Increasingly, no matter what you do, if you're peddling hamburgers at a MacDonald's or you're delivering packages for Federal Express, computers play some role in your life. Getting a good job is going to require utilizing computers and having technological literacy.

Individuals that do not have access to these technologies either at home or at work, or through public institutions, will be at a serious disadvantage when they look for a job, or try to keep a job.

We're trying to make sure that students in rural areas have access to the best teachers and facilities. We want to use video conferencing and computers; we want to use fiber optics and satellites; we want to make sure that prospective students can access Montana State University electronically to learn more about what MSU has to offer.

You can learn about the city of Bozeman, the programs available, find scheduled classes, look at the campus map and figure out how to apply for admissions without leaving your home town; whether your home town is Bozeman, whether your home town is Brooklyn. And that's why educational opportunities are so important.

This morning I woke up at dawn and drove down to Crow Agency, and I went to Little Big Horn College and had a chance to talk to some of the faculty members there, and they showed me what they're doing with the Internet. They showed me what they're doing with satellite technologies, trying to make sure that a small college on the Crow Reservation is able to use technologies so that their students and their community are connected to the information superhighway.

I was incredibly impressed, but they were impressed also. Not just that I would come, but with what Senator Burns has done to make what's happening at Little Big Horn a reality.

The NII is going to transform the way we deliver medical services across this nation. Others on the panel are far more knowledgeable than I am, but everyone should know the amount of health information available on the NII. You can obtain medical advice or even be examined long distance by a doctor from the best medical center, connected via video technology, or you can access electronic health information sources, such as the University of Montana Student Health Services' HEALTHLINE.

I remember reading 2 years ago in *Wired* magazine about a nascent technology that will allow a doctor in Atlanta, Georgia to actually feel a lump on a patient hundreds of miles away. There is a sensitive glove that will allow him a doctor, to feel the consistency, even the temperature of a lump, so you can get a sense of whether or not further diagnosis is necessary. It's incredible what technology will allow us to do in medicine.

One of the best examples of what the NII is all about is what the chairman referred to, the Internet, the global network of networks, and I'd like to give you a brief overview of the history of that Net.

In December 1969, the Defense Department through the Pentagon sponsored a UCLA infant network of four computers.



They called it ARPANET. The four computers could transfer data on high-speed transmission lines, and these four computers were the precursors of the Internet. My understanding is that that Net was designed to withstand a nuclear attack.

Thanks to ARPANET, scientists and researchers were able to share one another's facilities over long distances. People began using their own personal user accounts and addresses for electronic mail. It wasn't long before the invention of the "mailing list," which is an ARPANET technique in which an identical message could be sent automatically to a large number of network subscribers.

One of the first big mailing lists was SF Lovers, for science fiction fans. And as the seventies and eighties advanced, different social groups found themselves in possession of powerful computers.

ARPANET continued to grow. Connecting to the Internet cost the taxpayers virtually nothing, as each hookup was independent, and each person hooking up had to meet financing and technical requirements themselves. Like the phone network, the computer network was more valuable as it embraced larger and larger groups of people and resources.

The National Science Foundation in 1984 began to link newer, faster computers, super computers, through thicker, faster links. And upgrading occurred again in 1986, 1988 and 1990. Government agencies such as NASA, NIH and the Department of Energy began to join.

And the networks were divided into six different domains: GOV, MIL, EDU, COM, ORG and NET. GOV, MIL and EDU denoted governmental, military and educational institutions. COM stood for commercial institutions, ORG was nonprofit organizations, and NET were the gateways between the networks.

ARPANET formally expired in 1989, a victim of its own success. In the 1990's, the Internet is moving out of its base of military and research users into elementary schools and high schools, libraries, and more importantly perhaps, the commercial marketplace. And as the nineties move on, the Internet will continue to be easier and less expensive to access.

My wife likes to say, my wife's an engineer, and she likes to say when she was using the Internet 15 years ago, or 10 years ago, you needed to be an engineer. Now she says it's so simple even a lawyer can use it. And as a lawyer, I think that's a little bit better than what she was saying a little while ago, so simple even my husband can use it.

But today via the Internet, you can visit the Louvre Museum in Paris, you can visit the Library of Congress, you can purchase goods from hundreds of businesses, and you can send messages to your family, your friends or your colleagues. More and more people are getting on the Internet to send messages back and forth to their children in school.

I know my Deputy Assistant Secretary, Tom Sugrue, didn't learn how to use his computer until his daughter went to Grinnell College in Iowa. Then he found the cheapest and most successful way to reach her at any time of the day or night was over the computer network using the Internet. He had her E-mail address, she had his; she needed money, she needed to talk to him, use that Internet. He was seconds away.

Today there are 32 million users of the Internet in 137 countries, and the economy of the Internet approximates the economy of Holland. An important question for all of us here today is how do we assure that all Americans, especially those in rural states such as Montana, are connected to one another and to people around the world?

The private sector has to build this information superhighway, but government can play a role. Programs and policies that promote competition the types of bills that Senator Burns has introduced, can help get us there faster.

But as we're looking at how we get the private sector involved, we've got to think about the people elements. We've got to look at issues such as universal service. At NTIA, we're examining some of those issues.

We released a report called *Falling Through the Net*. We looked at 54,000 households surveyed by the Census Bureau and found that people living in rural areas are less likely to own a computer than people in urban areas. 23 percent of rural households own a computer, and 26 percent of urban households do. But when it comes to modems, 39 percent of rural households with computers have modems, but almost 50 percent of urban households have modems.

Simple things like telephone service. About 94 to 95 percent of Americans have a telephone in their home. If you look at Native American communities, 65 percent of Native Americans across this country have a telephone, 35 percent don't. But on some reservations such as the Navajo Nation, only 35 percent of the residents of the Navajo Nation have telephones at their home.

As we're talking about the information superhighway, we have to remember to pave the dirt roads in some communities.

There also aren't the underlying support mechanisms. If you look at America and you go to an urban community with over 250,000 people, 79 percent of libraries in those communities have Internet connections. In rural communities, fewer than 17 percent of libraries have access to the Internet, and in rural libraries, the libraries often have smaller collections of books. They need the Internet even more. We've got to look at policies to promote libraries being connected.

We've got to make sure the computers and modems, microwave towers, satellite dishes, get connected to the information superhighway in rural as well as urban communities.

We also have to come up with grant programs to support public/private partnerships. We're proud of the TIAP program, the Telecommunications and Information Infrastructure Assistance Program. It was zeroed out in committee, but thanks to the work of Senator Burns, we were able to save it on the Senate floor last week, so we'll have a program going forward.

And why is TIAP important? Because last year we put \$24 million into connecting communities that was matched by more than \$43 million from local communities and private businesses. We awarded 92 grants to projects in 45 states. More than 72 percent of our funds went to rural Americans or, underserved urban communities.

We're trying to be a catalyst. We're trying to make sure that you get telephone co-ops and telephone companies and cable companies and satellite companies working with communities to solve the problems in those local communities, but we also think we can provide blueprints of how these technologies can be used in similar communities.

Right here in Montana, we funded Hall Elementary School in rural southwest Montana—the first Internet connection in that school building. 25 students and 95 residents of the town now have access to the Internet, and they can get Montana information as well as international information. We put computer facilities in the two-schoolroom building, and at night many of the adults use it for continuing education. During the day the students are using it for basic education.

We also do research on technology, and I guess it was back in January or February I was first asked about coming back to Montana, and we gladly accepted. We started working at that time on our Survey of Rural Information Infrastructure Technologies.

When I found out what the date of this hearing was, I asked my staff to get this particular report ready so we could release it after this hearing. We think it's an incredible report. We've done an in-depth analysis of telecom services, two-way voice, multiple-voice teleconferencing, multiple-channel audio programming, low-speed to high-speed networking, video conferencing, multi-channel video programming, video demand, interactive video, rural information applications including e-mail and distance learning, access to computer-based data, local area networks, electronic commerce, all of those are going to require access to networks.

We hope that this survey will assist rural communities in learning how to connect to the NII.

Just briefly, let me tell you some of the conclusions we reached. Telecommunications services must be available in rural areas if rural areas are to survive economically. The two biggest barriers to bringing these services to rural areas are distance and low population density. We have to overcome those problems.

Systems and technology designed for urban areas may not work in rural areas, and we've got to find ways to approximate the utility while recognizing the problems.

Telecommunications can make rural areas more attractive for some businesses and result in revitalization of those rural economies. In other words, people can live where they want to live and still make a great living if we use these technologies wisely.

Deregulation may have some unintended consequences for rural areas where this competition is not going to get there as fast. So we have to deregulate, but we have to keep an eye on what deregulation means for rural Americans.

We also have to make sure that telephone co-ops maybe have to be mirrored by telecommunications co-ops. There's not going to be as high a return on investment in rural areas as in urban areas. We've got to find ways to focus on those issues.

Again, Senator Burns and the so-called "farm team" in the Senate are doing a tremendous job of focusing on rural issues and making sure that we look at this issue as it affects all of the rural communities around this nation.

And then finally, we have found that reaching isolated homes and businesses in farming areas and remote desert and wilderness areas will be difficult and will require technology deployment different from that in urban areas. Wireless technologies may be the best solution for many rural Americans.

NTIA and all of us in the Clinton Administration look forward to continuing to work with you, Mr. Chairman, and will continue to work on these issues, and I'm looking forward to the next few days of talking to people in Montana about the problems and opportunities facing Montanans. The best thing about this job is getting out of Washington, for lots of reasons I try to get out of Washington as often as possible, but getting out of Washington and talking to people about these issues is a critical part of my job.

Because the NII is a national and international phenomenon, but it's going to be solved by local solutions in the thousands of communities that comprise this great nation.

With that, Mr. Chairman, thank you for the opportunity to testify, and I look forward to the testimony of the other witnesses.

[The prepared statement of Larry Irving follows:]

#### PREPARED STATEMENT OF LARRY IRVING

I would like to thank Senate Commerce Committee Chairman Larry Pressler and Subcommittee Chairman Conrad Burns for inviting me to testify before this Subcommittee.

It is a pleasure to be here in Billings, representing the Clinton Administration.

Let me begin by introducing myself and my agency. I'm Larry Irving, Assistant Secretary for Communications and Information, and Administrator of the National Telecommunications and Information Administration (NTIA) at the U.S. Department of Commerce.

NTIA is the principal advisor to the President, Vice President, and Secretary of Commerce on domestic and international communications and information issues and represents the Executive Branch before the Congress, other Federal agencies, foreign governments, and international organizations. NTIA works to promote competition, encourage innovation, manage the federal spectrum, and generate new jobs. Spectrum engineers, policy analysts, economists, and lawyers work together on such diverse issues as negotiating for more global spectrum for mobile satellite services, hammering out the basic principles for telecommunications competition between countries, and establishing U.S. positions on such issues as privacy and intellectual property rights.

The subject of today's hearing—the National Information Infrastructure (NII) and the benefits it can bring for small business, state and local governments, education, and health care in rural areas—is one that is extremely important to the Clinton Administration and one on which we at NTIA have been actively engaged. I am glad to have the opportunity to highlight what the Administration is doing to bring the benefits of the NII to rural communities.

The NII, or "information superhighway" as it is commonly called, is about connecting people to one another, to services, and to information. Getting connected to the Information Age can bridge geographic barriers, promote equal access to educational opportunities, and improve a community's ability to attract businesses. It promises improved quality of life and increased productivity.

More than 3.6 million Americans work in the telecommunications and information industries, and millions more are affected by these technologies. Whether you are a mechanic in Helena, a farmer in Powder River or a small business owner in Billings, computer literacy is part of the job. Increasingly workers are pushing buttons on a computer keyboard rather than twisting bolts or running cash registers. Increasingly, getting a good job requires computer and technology literacy. Unless individuals have access to the NII, either at home, at work, or through public institutions, they will be at a serious disadvantage in finding and keeping a good job.

The NII can give students in rural areas access to the best teachers and facilities, via video conferencing and computers. Prospective students can access the Montana State University electronically to learn more about what MSU has to offer. For instance, you can learn about the city of Bozeman, the programs available, a schedule

of classes, campus highlights and how to apply for admission—without even leaving your home town. The NII makes educational opportunities easier for everyone, from all areas.

And the NII can transform the way we deliver medical services. Health information is available on the NII. You can obtain medical advice or even be examined long distance by doctors from the best medical centers by being connected via video technology. Or you can access health information on electronic health information sources, such as the University of Montana Student Health Services' HEALTHLINE.

An important question for all of us here today is how can we help ensure that the NII will connect all Americans, especially those living in rural areas such as Montana, to one another and to people around the world?

That's where government has an important role to play. We need to design policies and programs that ensure that the information superhighway extends to rural communities. And we are doing just that. I would like to share with you several initiatives we are working on at NTIA.

First, we are redefining universal service for the Information Age. NTIA recently released a report entitled, *Falling Through the Net*, based on a Census Bureau study of 54,000 households that found that people living in rural areas (defined as areas with populations of less than 2,500) are less likely to own a computer than people in urban areas. Overall, 23.1 percent of rural households own a computer, whereas 26.3 percent of urban households do. When it comes to having a modem, necessary to connect to networks, 39.8 percent of rural households with computers have modems, in contrast to 47.2 percent for urban households.

In addition, many rural communities do not have the underlying support structure or the equipment to take advantage of new technologies. While almost 79 percent of libraries that serve cities of 250,000 people or more have a connection to the Internet, only 17 percent of rural libraries do. Without computers, modems, microwave towers, satellite dishes, or cable connections, it is difficult for communities to get connected to the information superhighway.

At NTIA, we are working to formulate policies that can bridge these gaps and give rural Americans the same opportunities and access that people in urban areas have.

Second, we are administering the Telecommunications Information Infrastructure Assistance Program (TIAP). TIAP provides matching grants to schools, libraries, hospitals, state and local governments, and other non-profit entities. In 1994, TIAP leveraged \$24.4 million in Federal funds with \$43 million in private, state and local funding. We awarded 92 grants to projects in 45 states, the District of Columbia and the Virgin Islands. More than 72 percent of the funds went to projects serving rural America or traditionally underserved Americans living in urban areas.

By funding non-entertainment projects in predominately rural or underserved urban areas, TIAP served as a catalyst for developing innovative educational, health care, and civic applications that might not otherwise have found their way to the market. In addition, many of the projects served to demonstrate new and available technologies that can be used as blueprints by others in the future.

Through TIAP, a small capital investment can yield tremendous economic returns. For example, the Hall Elementary School District in rural southwest Montana is installing the town's first Internet connection in its school building. The connection provides the 25 students and 95 residents of the town with access to Montana statewide information services as well as national services. Computer facilities have been placed in the two room school building and will be available to all residents.

Third, today I am releasing an NTIA report entitled, *Survey of Rural Information Infrastructure Technologies*, which takes a comprehensive look at the availability of telecommunications technologies that can be economically deployed in rural areas. We have done an in-depth analysis of a wide range of telecom services, including two-way voice, multiple-way voice teleconferencing, multiple-channel audio programming, low-speed to very high-speed networking, video conferencing, multiple-channel video programming, video on demand, and interactive video. Rural information applications such as e-mail, distance learning, remote access to computer-based data, local area network connection, electronic commerce, and electronic government require access to a wide variety of these services. We hope that this comprehensive survey will assist rural communities in their choices of how to connect to the NII.

In the report, we come to the following conclusions about the development of the rural information infrastructure:

- It is desirable to have access to telecommunications services in rural areas that approaches those available in urban areas.
- Distance and low population density are the distinctive features of rural areas affecting telecommunications. These factors increase the costs of providing tele-



communications services. In addition, systems and technologies developed for urban areas may be less than optimal for rural areas.

- The distances involved in living in rural areas increase the benefit and therefore the value of telecommunications services. Telecommunications permit applications such as distancing learning that can alleviate or eliminate rural disadvantages. Telecommunications can make rural areas more attractive for some businesses and result in revitalization of the rural economy.

- The effects of deregulation on rural areas are less certain than on urban areas, and regulators should carefully watch them. Rural areas may not be able to support several competitive service providers. Multiprovider markets should be developed wherever feasible in both rural and urban areas as a means to reduce costs and spur innovation. Where a given market fails and only a monopoly service provider exists, policymakers should prescribe appropriate regulations to protect the public interest.

- Historically, the deployment of telecommunications capabilities in rural areas has been delayed relative to deployment in urban areas. This is a result of the inability of rural areas to compete with urban areas for capital because rural areas do not offer as high a return on investment. Telephone cooperatives have proven to be effective in accelerating the deployment of new technology. Telecommunications cooperatives could be an effective way of reaching rural areas with the NII.

- Government regulations and policies will play an essential role in the development of the rural information infrastructure. Different regulations and policies will likely be required in rural areas than in urban areas.

- The technical deployment of advanced telecommunications capabilities may not be very different in small towns than it is in urban areas. However, reaching isolated homes and businesses in farming areas and remote desert and wilderness areas will be difficult, and will likely require technology deployments different from that in urban areas. A wireless technology will most likely be required for remote users.

NTIA and the Clinton Administration will continue to work on these issues. I look forward to working with people in places such as Billings to connect everyone to the NII and all the benefits it can bring. Thank you.

Senator BURNS. Thank you, Mr. Irving, and let me add that there was one thing that was brought up in your testimony I just want to make comment on, the subject to do with the Defense Department.

Up until now, the Defense Department has done most of their research and development on communications because of national security concerns. That is what drove them to develop communications systems that would be secure and would also be reliable.

Now we see that is not the driver anymore. It is international competition that is driving us in this field; so, I think that point has to be made here.

Kathleen Fulton, Kathleen, thanks for coming out today. She's the senior consultant with Issue Dynamics, and will give us her views on so-called "distance learning," using the NII and the Internet to teach our kids.

Ms. Fulton, thank you very much for coming out today.

#### STATEMENT OF KATHLEEN FULTON, SENIOR CONSULTANT WITH ISSUE DYNAMICS, INC., WASHINGTON, D.C.

Ms. FULTON. Thank you, Senator. It's a pleasure to be here this afternoon to discuss the impact of the NII on education in rural areas.

Although, as of 2 weeks ago I now work for Issue Dynamics, a public affairs consulting firm in Washington, for this testimony I'll be drawing substantially on my 9 years of experience with the Congressional Office of Technology Assessment.

While I was with OTA, I conducted several major studies for Congress on the impacts of technology for schools. The first was the



1988 study on computers in schools called *Power On!*, and was followed in 1989 with our distance learning study called *Linking for Learning*. Most recently, this last spring, we released a study on the issue: of Teachers and Technology: Making the Connection.

I should also note that right now at the government printing office, we have another study called *Future Visions: for Education and Technology*, and this report will be released posthumously, if you will, after the death of OTA, which officially occurred today, October 1st.

My testimony draws on the lessons we learned in these studies about the potential of technologies and the ways that the NII can and should play an important part in this area. There are several key points I'd like to make.

First, technology alone is not a panacea for all of education's problems, but placed in the hands of a trained and well-supported educator, it can change and enhance the way teachers teach and learners learn. These are powerful tools for improving education.

Second, the nation's schools have increasingly invested in these technologies. Computers are one measure of the growth. Last spring there were approximately 5.8 million computers in America's schools, or about 1 for every 9 students. That's almost triple the amount that we reported in 1988. That's the good news, but there's bad news as well.

The OTA report suggests that the investments made in technology for schools have not been fully utilized. The sums invested are not insignificant. The total public K-12 instructional technology expenditures for 1993 were in the range of \$2.13 billion, and have grown every year.

But we're not using these powerful technologies to their full potential. Most activity involves teaching students about computers rather than using them as learning tools.

Elementary school students report spending less than a half an hour per week across all subjects using computers, and in high school, it's only a little more than an hour across all subjects per week.

Why is this use so limited? In the process of gearing up to give students access to computers, video and other emerging technologies, we've often overlooked what may be the central piece to the education technology equation, the teachers. By not giving teachers support to use these power technologies, training to use them effectively, and not providing them visions of powerful applications for teaching and learning, we may have been wasting these precious resources, both teacher talent and technological power.

But we do have an opportunity to break this cycle. A major opportunity now lies in the potential offered by the expansion of the NII.

What makes telecommunications different? As you know, the classroom is a closed setting, as is the school building itself. In the past, teaching was limited by the teachers available at that site and the resources available to them there. A student's school learning experience was limited by what resides in the head of the teacher, the pages of the textbook, and the books on the school library shelf.

Although we say we want equal access to educational resources for all children, this is far from the reality today. No one knows this better than those of you struggling to bring the best of education's resources, teachers and materials to students in isolated rural areas.

And in the past, we have denied classroom teachers perhaps the most powerful communication tool ever invented, one that's been around for over a hundred years, the telephone. When only one teacher in eight has a telephone in the classroom, the message is clear: the classroom is a closed system, and the outside world is not invited in.

As one educator noted, the telephone is perhaps the only technology schools don't provide teachers for fear they *will* use them. Yet we have as a national goal, and I believe every school subscribes to this, that we promote increased parental involvement in the schools.

A small step forward would be to offer teachers, if not a phone of their own, at least voicemail so they can more easily receive and send messages to parents. Yet voicemail, which is a necessity in businesses and many homes today, is available to less than 1 percent of all teachers.

It may be ironic that schools will finally get the most basic of technologies, a phone line, thanks to the most powerful of applications, the potential for Internet access. When schools are linked to the NII, the walls of the classroom become permeable and the outside world does become available.

As one teacher observed, "Electronic networks bring real equality of education to students. My inner-city students were learning and participating with private school students who have access to very specialized equipment. Through Internet, my students were unaware of the social status of these students. It was wonderful to watch them exchange scientific information with students they would be very uncomfortable with in a classroom."

Well, this is equally true for students from rural areas as they work with students from more sophisticated city or suburban schools. On the Net, no one knows if you're wearing the latest high-top sneakers or low-slung jeans! It's your ideas that count, and communicating them well becomes the central goal.

At OTA we followed the growth of distance learning technologies with great interest. As you may be aware, most of today's distance learning activities occur at the high school level; fewer benefit elementary school students. Typically, students take courses not available in their home schools, and go to a room set aside and equipped specifically for this activity.

It has been a boon to many communities, like the Greater Richland Education & Technology Consortium in southeastern North Dakota, a group of five high schools and vocational center who share teaching resources in math, science, foreign languages, vocational education and college prep, using a U.S. West analog two-way video network.

But as the technologies advance, so can the applications. For example, in rural Dutchess County, New York, BOCES, the regional education resource center, is working with the regional bell operat-

ing company, NYNEX, in setting up a project that demonstrates an even more flexible model for distance learning.

They're linking local high schools with their feeder elementary schools in setting up "distance learning on a cart" systems so that clusters of students in the regular elementary school classrooms can be working in one corner, perhaps taking a class from the same Japanese teacher who had earlier in the day been working with the high school students.

In this model, several monitors are placed on carts that can be rolled into the classroom as needed, giving all the children in rural communities greater opportunities for cultural, aesthetic or foreign language instruction or resources.

We also saw how the NII provides opportunities for new models of student learning. For example, when students conduct electronic research searches on the Net, they not only have a broader range of instructional resources at their command, they also have an opportunity to learn to use electronic tools to access information and develop research skills, using many of the technologies they will be facing in the future.

We are also seeing an increasing number of curriculum-based telecommunication projects with a global focus and range. For example, in the Globe Program, students collect data on current research identified by scientists around the world. One group is collecting local data on the effect of ozone depletion on pine trees. This data is compared with that collected by students in other regions, looking at other species of pine trees for comparable or different effects, helping gain a broad picture of ozone impacts across geographic regions.

The students compare data and share it with real scientists who otherwise would not have access to this rich base of localized research data. In the process, the students learn not just facts about environmental science, but the process and skills of scientific investigation using computer data bases and telecommunications, and what is now the new skill of "telecollaboration."

We also see great impacts for teachers themselves. We have 2.8 million teachers in our schools today, but by the year 2003, we'll need 3.3 million. Perhaps the most promising aspect of the NII are the opportunities for teachers: for training new teachers, improving skills for our existing cohort of teachers, and giving all teachers more professional tools with which to carry out their daily activities.

Particularly empowering are opportunities for the professional development that bring teachers the best training available anywhere, anytime. The old model of one size fits all professional development for teachers was never particularly popular, nor particularly effective, but using telecommunications, new models can emerge.

For example, PBS' "Middle School Math Project" is a year-long professional development course for mathematics teachers. Each group of 25 teachers and a mentor teacher looks at videos distributed by the local PBS stations, but what makes this different than just a video course are the virtual learning communities set up among these groups of teachers. They can log on at 2 a.m. if that's when the inspiration hits them, and discuss points that they have

learned in these videos about teaching math according to the NCTM standards, and they can "talk" on the net about how this works in their classrooms.

Formal training opportunities are also available for distance learning networks like what you have here in Montana with the Big Sky Network.

We also saw in our study wonderful opportunities to use telecommunications to improve the training of new teachers. Video could extend the range of student observations into classrooms with the best teachers wherever they're located. Live broadcasts, videos or interactive CD-Roms can provide teacher education students with models of effective teaching and the opportunity to reflect on what makes pedagogy really powerful.

The University of Wyoming is using compressed video for this effectively. Similarly, at the University of Northern Iowa, student teachers can communicate with their mentors and their College of Ed faculty over the fiber optic network they have set up.

Electronic networks such as these can provide a safety net for communication, knowledge and experience for student teachers in the field as well as new teachers launching their careers. The loneliness, anxiety and difficulties of first teaching experiences can be mitigated through contact with professors and peers via electronic networks.

Promising as these opportunities seem, most teachers still do not have access to the resources the NII can offer. A recent study found that most teachers access telecommunication networks not at school but at home. They go on line on their own time, on their own computers, often paying for this out of their own personal budgets. It's not surprising when we see that only 3 percent of all instructional rooms in America's schools are linked to the Internet, and these include media centers and other places outside the regular classroom.

Similarly, technological resources in colleges of education are also limited. As a result, we are training tomorrow's teachers without recourse to today's technologies, much less the technologies the students will use in the future.

Where are the opportunities for change? The OTA report noted several areas for Federal policy. These include leadership that legitimizes, funds and targets technologies as resources for school improvement. The Federal Government has always had an important role in supporting research, development and dissemination of promising practices.

Investments in R&D for the production of powerful, flexible technology-based learning tools and applications could greatly benefit all schools, and greater support for colleges of education to bring them into the 21st century in their resources and expertise is both a state and Federal responsibility.

But perhaps the greatest and most immediate opportunity lies in the legislation recently passed by the House and Senate revising the Communications Act of 1934, which could provide greater school access to emerging national and global telecommunication infrastructures.

The legislation being considered in the upcoming House and Senate conference committee could encourage competition in tele-

communications, open new markets, allow schools an opportunity to choose among a number of service providers. Creating the opportunity for affordable access to the most up-to-date telecommunications resources is critical if all schools are to take advantage of the power and the potential of the emerging National Information Infrastructure. Thank you.

[The prepared statement of Kathleen Fulton follows:]

#### PREPARED STATEMENT OF KATHLEEN FULTON

Hearing on the Uses of National Information Infrastructure in Providing Services to Small Industry, State and Local Governments, and Education in Rural Areas

It is a pleasure to be here today to discuss the impact of the NII on education in rural areas. Although I now work for Issue Dynamics Inc., a public affairs consulting firm in Washington, D.C., for this testimony I will be drawing on the nine years I spent in the education program at the Congressional Office of Technology Assessment.

While at OTA, I conducted several major reports for Congress on the impacts of technologies on schools. In 1988 we released *Power On!*, a baseline study on the potential of computers for education, and barriers to meeting that potential. In 1989 we issued *Linking for Learning*, reporting on the use of distance learning technologies for increasing educational services (a topic of special interest then to rural areas). The 1993 study on *Technologies of Adult Literacy* extended the analysis of technologies for education to their potential as a way to enhance the delivery of educational services for the 35 million American adults lacking literacy skills. And, this past April, we released the report *Teachers and Technology: Making the Connection*. I should also mention that OTA has another educational technology study now at the Government Printing Office, on the topic of *Future Visions: for Education and Technology*. This report will be released posthumously, after the death of OTA, which officially occurred as of today, October 1st.

This testimony draws on the lessons learned about the potential of technologies from each of these studies, and recommendations as to the role that the multiple resources of the NII can and should play in this area. Looking across the spectrum of these reports, several trends have clearly emerged. Let me summarize these briefly:

1. Technology alone is not a panacea for all of education's problems, but placed in the hands of a trained and well supported educator, it can change and enhance the way teachers teach and learners learn. These are powerful tools for improving education.

2. The nation's schools have increasingly invested in these technologies. Computers are one measure of growth. Last spring there were some 5.8 million computers in America's elementary, middle, and secondary schools, or about one computer for every nine students. That's almost triple the amount OTA reported on in 1988. That's the good news.

3. However, there's bad news as well. The OTA report suggests that the investments made in technology for schools have not been fully utilized. These sums are not insignificant—the total public K-12 instructional technology expenditures for 1993 were in the range of \$2.13 billion, and growing every year. Despite these investments, the most common activities with computers for elementary students have been drills in basic skills and instructional games. School computer coordinators estimate that students spend the most computer time learning to type on keyboards and use wordprocessing programs. In secondary schools, computers are used relatively infrequently for teaching and learning in traditional academic subjects. Most activity involves teaching students about computers, rather than using them as learning tools. The most recent OTA study found that students report that they spend 24 minutes per week using computers in grade 5, 38 minutes per week in grade 8, and 61 minutes per week in grade 11. This is across all subjects within a total week, and is just an average. Some have more time on computers, but many have much less.

4. The most recent OTA report suggests that, in the process of gearing up to give students access to computers, video and other emerging technologies, we have often overlooked what may be the central piece to the educational technology equation—the teachers. By not giving teachers support to use these powerful technologies, not training to use them effectively, and not providing them with visions of powerful applications of technologies for teaching and learning, we have wasted these precious resources—both teacher talent and technological power.



5. We have an opportunity to break this cycle. A major opportunity lies in the potential offered by the NII. Some have suggested, and I would agree, that telecommunications may indeed be the "killer application"—the piece of the puzzle that makes the rest of the power of computers "come into focus" for teachers.

*What Makes Telecommunications Different?*

The classroom is a closed setting, as is the school building itself. In the past, teaching was limited by the teachers available at the site, and the resources available to them. The student's school learning experiences were limited by what resides in the head of the teacher, the pages in the textbook, and the books on the school library shelves. Although we promote equal access to educational resources for all children, this is far from a reality today. No one knows this better than those of you who struggle to bring the best of educational resources—teachers and materials—to students in isolated rural areas.

Furthermore, in the past we have denied classroom teachers perhaps the most powerful communication tool ever invented—one that's been around for 140 years—the telephone. When only one teacher in eight has a telephone in the classroom the message is clear: the classroom is a closed system and the outside world is not invited in. As one educator noted, the telephone is perhaps the only technology schools don't provide teachers because they are afraid they will use them! Yet we have as a national goal—and every school subscribes to this—that schools promote increased parental involvement in schools. A small step forward would be to offer teachers, if not a phone of their own, at least voicemail so they can send and receive messages to parents. Yet today voicemail, a necessity now in businesses and many homes, is available to less than one percent of all teachers.

It may be ironic that schools will finally get the most basic of technologies, a phone line, thanks to the most powerful of applications, the potential for Internet access. Yet this resource, and other technological applications available through the NII, could change the face of education more significantly than any other factor in the last century.

When classrooms are linked to the NII the walls of the classroom become permeable and the outside world becomes available. What does this mean for students, for teachers, and for the community?

Teachers say the following about extending the learning environment via telecommunications:

"Electronic networks bring real equality of education to all students. My inner-city students were learning and participating with private school students who have access to very specialized equipment. Through Internet, my students were unaware of the social status of these students. It was wonderful to watch them exchange scientific information with students they would be very uncomfortable with in a classroom."

This is equally true for students from rural areas as they work with students from more "sophisticated" city or suburban schools. On the Net, no one knows if you are wearing the latest high top sneaker or low slung jeans. Your ideas are what count—and communicating them well becomes a central goal.

Another teacher said of the access to the Internet: "it has expanded our classroom...blown away the walls...filled us with a sense of possibility...made us less provincial...personally involved us with the nation and the world."

*Opportunities for New Distance Learning Models*

Most of today's distance learning activities occur at the high school level and do not reach down to benefit elementary school students. Typical distance learning activities have been full courses in areas like Advanced Placement or foreign languages that would not otherwise be available in every school. Typically, students all go to a room set aside and equipped specifically for this activity. It has been a boon to many communities, like the Greater Richland Education & Technology Consortium (GREAT) in southeastern North Dakota, a group of five high schools and a vocational center who share teaching resources in the areas of math, science, foreign language, vocational education and college prep classes, using a US WEST analog two-way video network.

As the technologies advance, so can the applications. For example, in rural Dutchess County, New York, BOCES, the regional education resource center, is working with the regional bell operating company, NYNEX, in setting up a project that demonstrates a more flexible model for distance learning opportunities. NYNEX is linking local high schools with their feeder elementary schools, and setting up "distance learning on a cart" systems for clusters of students in their regular elementary school classrooms. While one group of students may be working in the reading cluster, another in the computer corner, and others at their desks with the teacher, an additional group of students might be taking a Japanese class from the same teacher who had been teaching the high school students from a distance. The idea is to



give elementary students greater exposure to the same extended curricular resources the high schools are tapping into. In this model, several monitors are placed on carts that can be rolled into the classroom as needed, for greater opportunities for cultural, aesthetic, or foreign language instruction or resources. Perhaps even more exciting are the opportunities to have high school students themselves "beamed in" to the elementary schools to teach or tutor younger students, or work with them on joint projects. In addition, teachers at the elementary schools can work with high school teachers in collaborative curriculum development activities that grow with the students.

#### *Opportunities for New Models of Student Learning*

Technology-using teachers express enthusiasm for benefits of technology that may or may not be reflected immediately in simple measures of student learning. They are excited by long term impacts of bringing a wider range of resources to the classroom, motivating learners, providing new teaching tools, accommodating individual learning styles, and, eventually, redefining the role of the teacher. For example, when students conduct electronic research searches on the Net, they not only have a broader range of instructional resources at their command, they also have the opportunity to learn to use electronic tools to access information and develop research skills using the technologies they will face in the future.

Today there are an increasing number of curriculum-based telecommunication projects with a global focus and range. For example, in the Globe Program, students collect data on current research topics identified by a group of scientists around the world. One group is collecting local data on the effect of ozone depletion on pine trees. This data is compared with the data collected by students in other regions looking at other species of pine trees for comparable or different effects, helping to gain a picture of ozone impacts across geographic regions. The students compare data and share it with "real" scientists who otherwise would not have this rich base of localized research data. In the process, students learn not just facts about environmental science, but the process and skills of scientific investigation, using computer databases and telecommunications, and the new skills of "telecollaboration."

But collaborative research on the net doesn't have to be confined to science. Other students worldwide are collecting, sharing, and jointly publishing first hand reports of Holocaust survivors, or of those who have suffered under today's comparable ethnic cleansing horrors in places like Bosnia.

Projects like these supply not just curriculum for students, but focus, boundaries, and vehicles for interaction. They also provide teachers with the content, materials, organizational help, and technical assistance they may need to work telecommunications into their curriculum and lesson plans.

#### *Opportunities for Improving Teacher Development*

Telecommunications and the NII are powerful educational tools for teachers themselves—for training new teachers, improving the skills of existing teachers, and giving all teachers more professional tools with which to carry out their daily activities. The most obvious example is how teachers can pull down resources on the net to help them develop exciting, relevant, up-to-date lessons and activities. Today's news becomes the basis for tomorrow's lesson.

Even more empowering are the opportunities for professional development—bringing to teachers the best training available, anywhere, anytime. The old model of "one size fits all" professional development for teachers never was popular, nor was it particularly effective. Ask any teacher about being "inserviced"—gathering with every other teacher in the district for a smattering of information on cultural awareness, whole language instruction, or what ever is the current hot topic in education. Most will tell you that it's not applicable to their daily classroom needs. It doesn't have to be that way. For example, the PBS "Middle School Math Project", the first of several planned mathline services, is a year-long professional development course for middle school mathematics teachers. Each Mathline group has 25 teachers and a mentor teacher. Twenty participating public broadcasting stations, representing 16 states, manage the project, broadcasting video lessons and distributing course materials over the computer network, and offering technical support to participants. The 25-hour long video segments model instructional approaches and content promoted by the NCTM standards to help build students' skills in reasoning, estimating, communicating, and problem solving in math. What makes this more than just a prepared video course, however, are the continuing discussion groups on the Internet for participating teachers from around the country, facilitated by a master teacher. Teachers report that they are delighted to be freed from inflexible inservice training at a set time and place. As a teacher in rural Minnesota said, "Most teachers are isolated in their classrooms. This gives them exposure".

More formal training opportunities are also available through distance learning networks like the Maine Distance Learning Network, the community colleges sys-

tem for the state of Maine, supported by NYNEX. Because Maine, like Montana, is a predominantly rural state, with severe winter weather inhibiting easy transportation across great distances, distance learning offers perhaps the only means to bring the best instruction to all citizens, including teachers, for continuing professional growth. As facilities, services, and applications on the NII continue to expand, today's exciting new professional development opportunities will become tomorrow's necessities.

We also saw in our study wonderful opportunities to use telecommunications to improve the training of new teachers. Video can extend the range of student observations into classrooms with the best teachers, wherever they are located. Live broadcasts or CD-Roms can provide teacher education students with models of effective teaching and the opportunity to reflect on what constitute good pedagogy. Video can show case studies and record observations for teacher education students to discuss and reflect upon in greater detail after a lesson has been prepared. These too can be shared across networks, in situations where student teachers are far from their university faculty as they conduct practice teaching in their student teaching assignments. Opportunities for apprenticeship can be expanded when students can connect to mentoring and information resources over great distances.

Electronic networks can provide a safety net for communication, knowledge, and experience for student teachers in the field, as well as for new teachers launching their careers. The loneliness, anxiety, and difficulties of the first teaching experiences can be mitigated through contact with professors and peers via electronic networks.

#### *Reality versus Potential*

Promising as these opportunities seem, most teachers still do not have access to the resources the NII can offer. A recent study found that most teachers (69%) access telecommunications networks not at school but at home. They go on line on their own time, often paying for this out of their own personal budgets. This is not surprising when we see that only 3% of all instructional rooms in America's schools are linked to the Internet—and these include media centers and other places outside the classroom.

Similarly, facilities in colleges of education are also limited. As a result, we are training tomorrow's teachers without recourse to today's technologies.

#### *Opportunities for Change*

The OTA report noted several areas for Federal policy. These include leadership that legitimizes, funds, and targets technologies as resources for school improvement. The Federal government also has always had an important role in supporting research, development and dissemination of promising practices. Investments in R&D for the production of powerful, flexible technology-based learning tools and applications could greatly benefit all schools. Greater attention to support for colleges of education, to bring them into the 21st century in terms of resources and expertise, is both a State and Federal responsibility.

Perhaps the greatest opportunity lies in legislation passed by the House and Senate to revise the Communications Act of 1934 to provide greater school access to emerging national and global telecommunication infrastructures. Legislation being considered in the conference committee could encourage competition in telecommunications, open new markets, and allow schools an opportunity to choose among a number of service providers. Creating the opportunity for affordable access to the most up-to-date telecommunications resources is critical if all schools are to take advantage of the power of the emerging National Information Infrastructure.

Senator BURNS. Thank you. We now will hear from Kristianne Wilson of Deaconess-Billings Health System. They have been very active in telemedicine in the last two, three or 4 years, I guess, ever since we started talking about such technologies and how it fits into our health care system. So Kristianne, thanks for sacrificing your Sunday afternoon.

And by the way, for the three of you who are here, I guess, we have a disease in Washington, D.C. about this time of year called Redskins, and the Skins did beat the Cowboys 27 to 24 today. So I know, William, that this catches you by a big surprise, but I thought I would pass that information along to you.

Thank you, Kristianne.

**STATEMENT OF KRISTIANNE B. WILSON, VICE PRESIDENT,  
MARKETING AND REGIONAL SERVICES, DEACONESS-BIL-  
LINGS CLINIC HEALTH SYSTEM, BILLINGS, MONTANA**

Ms. WILSON. Thank you, Mr. Chairman.

I am Kristianne Wilson, Vice President of Marketing and Regional Services for Deaconess-Billings Clinic Health System, and have administrative accountability for the Eastern Montana Telemedicine Network. I have been asked to describe the telemedical uses of the information infrastructure, and discuss what impact this technology can have on rural health care systems.

The Eastern Montana Telemedicine Network became operational in September 1993 in Culbertson, Sidney, Glendive,

Miles City and Billings, Montana. These site locations include hospitals, a mental health center and a medical assistance facility.

The network from its beginnings had four major components: First, delivering specialist physician consultation through video conferencing; second, delivering mental health consultative services; offering continuing medical and higher education programming to rural communities; and last, providing community outreach and telebusiness opportunities to geographically isolated rural communities.

The equipment in the original rural sites was funded through a grant from the REA. A 3-year grant from the Office of Rural Health Policy has allowed the telemedicine network to plan for growth that was both feasible and cost effective.

This grant began in October 1994 with Colstrip, an outpatient medical complex, and Deaconess Behavioral Health Center being added to the video network. Second- and third- year sites to be added include hospitals in Glasgow, Baker and the Community Health Center here in Billings, the site of Montana's first post-graduate medical education program, a Family Practice Residency.

As a regional referral center, Deaconess-Billings Clinic recognizes many of the problems associated with the delivery of rural medical care. All or part of 41 of Montana's 56 counties are designated as health professional shortage areas, including all or portions of the counties served by this telemedicine network. Population density of much of this network service area classifies as frontier.

One of the factors contributing to the problems of rural health care systems is the tendency for rural residents to leave their local communities for health care services.

Outmigration results in decreased utilization of rural community hospitals and physician practices which undermines a key component of their local economies. We sought to address this factor by providing specialty services in the client's home communities through the telemedicine network.

A dedicated T-1 network supports the eight-site full-motion interactive video conferencing network. Utilizing video conferencing units, the network operates on 384 kilobytes per second, with a type of compression which meets the imaging needs of both clinical and non-clinical applications.

The equipment we use is PC-platform based, and is international standards compliant. This allows us to be compatible with other telemedicine projects across the nation.

The network is leased from our regional Bell operating company, U.S. West. Multi-point conferencing capability is configured into the network to allow any point on the network to conference with any other, or all points to conference together simultaneously.

Two-way video compression or digital video enables a two-way signal to be transmitted through special phone lines, fiber optics are not required in this network, and reassemble as images on monitors at single or multiple receiving sites. Through this technology, it is possible to closely replicate or even enhance most of the interactions that take place in face-to-face encounters, from a patient diagnosis and treatment to a business conference.

Although the technology has existed for a number of years, it has greatly improved in quality and become less expensive, more reliable and easier to use.

We have also integrated Picasso telephones into the network. These telephones send a high-quality, full-color, still image over standard analog telephone lines. This technology has been incorporated because of its relative low cost and its ability to transmit over plain old telephone service. The technology is now being utilized in the Montana communities of Terry and Glendive.

Our experience confirms that telemedicine holds enormous potential for rural communities. These benefits include an enhanced ability to service the health care needs of surrounding rural communities by providing telemedicine consults.

Specialist physician consults via telemedicine enhances the scope of services delivered by the rural provider and prevents unnecessary outmigration of health care. In our experience, the smaller more geographically isolated communities have the greatest usage of medical consultations.

In our 22 months of operation, we have conducted 345 telemedical consultations. Psychiatric consultations represent 75 percent of the usage, with dermatology, neurology, pathology and orthopedics representing the majority of the balance.

Our significant mental health usage is reflective of the lack of professional mental health services in much of our vast state. 43 of Montana's 56 counties have no psychiatrist. There are no child psychologists, and no psychiatrists in all of eastern Montana. The closest reside in Billings.

Telemedicine provides a cost-effective alternative to travel for either the patient or the provider.

In summary, the prevalence of mental disorders in rural areas is similar to that of urban centers, yet the services available to the rural residents are usually more limited both in number and scope. These services that do exist are most commonly provided by non-physician psychiatric professionals.

The Eastern Montana Community Mental Health Center in Miles City, one of our telemedicine sites, has the fourth largest catchment area in the country. In eastern Montana, 63 percent of clients are referred by family, friends or themselves; 38 percent of the clients served are children, and 65 percent of the families served have an income of less than \$200 per week.

Since the start of the telemedicine network, patient disposition as a result of the consultation has been monitored. Only three pa-

tients have been referred as a result of the consult. The remainder have been retained in their local community.

It is safe to estimate that 99 percent of patients seen by telemedicine are retained in their community, providing increased revenue and stability for all local providers. All but 1 of 345 consults we've done on our network have provided outpatient care.

Enhancing the level of communication and exchange of information between isolated rural physicians and their urban colleagues will decrease the rural physician's perception of professional isolation. We know this issue contributes to the difficulty recruiting and retaining quality physicians in rural areas.

Also, video conferencing can help increase the access to locally available continuing medical education offerings, which reduces the amount of time and dollars they have to spend away from their small practices.

In 20 months of operation, 143 educational programs of all types were conducted over the network. There were approximately 4,000 attendees, with over 900 of those being from the rural communities. Those programs ranged from a half-day symposium on primary care geared toward physicians, to general health information and education to the public on topics such as sleep disorders, cardiac problems and diabetes.

Satisfaction survey information, from participants, receiving educational offerings through video conferencing has shown overwhelming satisfaction.

Telemedicine services has resulted in decreased costs and lost productivity associated with administrative and educational travel. It decreases what we in eastern Montana call "windshield time," or what the Texas telemedicine program refers to as "salary spilled on the highway."

By the same token, telemedicine does result in decreased overall cost to rural residents for accessing health care services by demonstrating savings in their time and travel. These expenses, by the way, are not even considered in the national health care expenditure figures.

In our experience, patient clearly benefit from telemedicine services. The patient travel time, mileage and associated meal and lodging expenses to seek a specialist consult in Billings as an alternative to a telemedicine consult have been calculated for each community on our network. For a 1-year period of time, the total patient savings as a result of just the mental health consults is estimated to be close to \$100,000.

The potential results of the non-medical applications include improved educational opportunities, enhanced communication between business associates, and expanded market areas.

When we researched the prospect of telemedicine and the associated transmission costs in our rural environment, it was anticipated that medical applications alone would not create long-term network viability. Since its implementation in September 1993, the Eastern Montana Telemedicine Network has been promoted by the participating sites as a community network, a vehicle for providing continuing education and telebusiness applications.

For the first year of operation, the network was promoted to the participating communities for use free of charge. In September



1994, the network began charging for non-medical applications over the network. A comprehensive marketing plan was developed which identified the primary value of the network for each of the network sites.

In some communities, medical applications was the primary value; for others, continuing education for their staff was of primary importance. Currently the Network is generating approximately \$1,000 per month in network charges for telebusiness. Plans are underway to increase that revenue to \$2,000 per month.

Telebusiness is an important source of revenue for each of the rural hospitals who are paying their network transmission costs. They cannot absorb new costs into their overall budgets, therefore defraying a portion of the transmission costs through outside users has been our strategy.

There are several issues which I believe are distinct barriers to the implementation of telemedicine in all rural communities across the country. The cost of video conferencing equipment continues to drop, however, it is still cost-prohibitive for the smallest rural facilities.

Federal grant programs like the REA's, now RUS Distance Learning and Medical Link Program, and the Rural Hospital Transition Grant Program continue to be the best chances for these facilities to acquire this equipment. I encourage you to consider continued funding for these and similar programs.

The nation's telecommunications infrastructure needs continued improvement, and network costs need to be made more affordable.

On the pricing side, lower rates should be encouraged through marginal pricing standards. I want to acknowledge and endorse the language in the Snowe-Rockefeller amendment of Senate Bill 652 which recently passed, which would allow some rate discounting for non-profit services like telemedicine, but encourage close Federal guidance to clarify the intent of this amendment.

I also believe the issue of reimbursement for telemedicine services must be addressed. The Health Care Financing Administration does not reimburse for direct patient care services provided by telemedicine to Medicare recipients except in a few selected telemedicine programs. Most third-party insurers are following HCFA's lead.

In Montana, however, Medicaid does reimburse for telemedicine consultations. They have historically paid for patient travel costs and see the savings potential.

It is safe to say we will never convince physicians to provide consultative services over a technology that will decrease the number of patients that come in to see them in their office if they cannot be reimbursed for the consultation.

I believe the overall cost of providing health care services will ultimately decrease if this technology is implemented on a national scale, but first, we must provide the motivation for that implementation. I would ask you to consider legislation mandating Medicare coverage for telemedicine services.

Because of the ability of the information superhighway to link seamlessly a physician in one state and a patient in another, interstate credentialing has become an issue within telemedicine circles. I urge the Federal Government to push for a standardized



credentialing process that allows reciprocity for telemedicine consultations.

Mr. Chairman and members of the committee, thank you very much for this opportunity to share our experience on telemedicine. [The prepared statement of Kristianne B. Wilson follows:]

#### PREPARED STATEMENT OF KRISTIANNE B. WILSON

Mr. Chairman, and members of the Committee:

I am Kristianne Wilson, Vice President of Marketing and Regional Services for Deaconess-Billings Clinic Health System (DBCHS) and have administrative accountability for the Eastern Montana Telemedicine Network (EMTN). I have been asked to describe the telemedical uses of the information infrastructure and discuss what the impact this technology can have on rural healthcare systems.

The Eastern Montana Telemedicine Network was envisioned by Deaconess-Billings Clinic Health System, an integrated 272 bed tertiary care hospital and 120 medical specialty group practice in Billings, Montana serving a 300 mile radius area that includes eastern Montana, northern Wyoming, and the western Dakotas.

The network has four major components:

1. Delivering specialist physician consultation through videoconferencing
2. Delivering mental health consultative services
3. Offering continuing medical and higher education programming to rural communities and
4. Lastly, providing community outreach and telebusiness opportunities to geographically isolated rural communities.

The EMTN became operational September 1993 in Culbertson, Sidney, Glendive, Miles City, and Billings. These site locations include hospitals, a mental health center, and a medical assistance facility. The equipment in the original rural sites was funded through a grant from Rural Electric Administration (REA).

A three year grant from the Office of Rural Health Policy (ORHP) has allowed the EMTN to plan for growth that was both feasible and cost effective. This grant began in October 1994 with Colstrip, an outpatient medical complex and Deaconess Behavioral Health Center being added to the video network. Second and third year sites to be added include hospitals in Glasgow, Baker, and the Community Health Center in Billings, the site of Montana's first post graduate medical education program, a Family Practice Residency.

As a regional referral center, DBCHS recognizes many of the problems associated with the delivery of rural medical care. All or part of 41 of Montana's 56 counties are designated as Health Professional Shortage Areas (HPSAs) by the U.S. Department of Health and Human Services, including all or portions of the counties served by this network. Population density of much of this network service area classifies as frontier. One of the factors contributing to the problems of rural health care systems is the tendency for rural residents to leave the local community for health care services. Outmigration results in decreased utilization of rural community hospitals and physician practices which undermines a key component of the local economy. We sought to address this factor by providing specialty services in the client's home communities through the EMTN.

A dedicated T-1 network supports an eight site full motion interactive videoconferencing network. Utilizing videoconferencing units, the network runs at 384 kbps with VTEL Blue Chip compression which meets the imaging needs of clinical and non-clinical applications.

The videoconferencing equipment used is PC platform based and CCITT standards compliant. This allows us to be compatible with other telemedicine projects across the nation.

The telecommunications network is leased from the regional Bell operating company. Multi-point conferencing capability is configured into the network to allow any point on the network to conference with any other, or all points to conference together simultaneously.

Two-way video compression, or digital video, enables a two-way signal to be transmitted through special phone lines (fiber optic lines are not required) and reassembled as images on monitors at single or multiple receiving sites. Through this technology, it is possible to closely replicate or even enhance most of the interaction that takes place in face-to-face encounters—from patient diagnosis and treatment to a business conference. Although the technology has existed for a number of years, it has greatly improved in quality and has become less expensive, more reliable and easier to use. We have also integrated Picasso telephones into the network. The Picasso telephone by AT&T sends high quality, full color, still images over standard

analog telephone lines. The advantages of this technology include its relative low cost and its ability to transmit images over "plain old telephone service." This technology has been implemented between Terry, Glendive, and Billings.

Our experience confirms that telemedicine holds enormous potential for rural communities. Benefits include:

- Enhanced ability to serve the health care needs of surrounding rural communities by providing telemedicine consults to, or receiving them from other participating sites.
- Specialist physician consults via telemedicine enhances the scope of services delivered by the rural provider and prevents unnecessary outmigration of healthcare services. In our experience, the smaller more geographically isolated communities have the greatest usage of medical consultations.
- In 22 months of operation, we have conducted 345 telemedical consultations. Psychiatric consultations represent 75% of the usage with Dermatology, Neurology, Pathology, and Orthopedics representing the majority of the balance. Our mental health usage is reflective of the lack of professional mental health services in much of our vast state. Forty-three of Montana's 56 counties have no psychiatrist. There are no child psychologists, and no psychiatrists in all of eastern Montana. The closest reside in Billings. Telemedicine provides a cost-effective alternative to travel for either the patient or provider. In summary, the prevalence of mental disorders in rural areas is similar to that in urban centers yet the services available to rural residents are usually more limited, both in number and scope. Those services that do exist are most commonly provided by non-physician psychiatric professionals. The Eastern Montana Community Mental Health Center (EMCMHC) in Miles City (one of our telemedicine sites) is the 4th largest catchment area in the country. In eastern Montana, 62.9% of clients are referred by family, self, or friends. 38% of the clients served are children and 65% of families served by the EMCMHC have an income of less than \$200/week.
- Expanding the scope of services available at the local level with telemedicine consults has resulted in the retention of patients and their health care dollars in the rural community.
- Since the start of the EMTN, patient disposition as a result of a telemedicine consultation has been monitored. Since the beginning of data collection, only three patients have been referred as a result of the consult. The remainder have been retained in the community. It is safe to estimate that 99% of patients seen by telemedicine are retained in the community, providing increased revenues for all local providers. All but one of the 345 consultations have involved outpatient care.
- Enhancing the level of communication and exchange of information between isolated rural physicians and their urban colleagues will decrease the rural physicians' perception of professional isolation. We know this issue contributes to the difficulty recruiting and retaining physicians in rural areas.
- Providing increased access to locally available continuing medical education offerings will decrease rural providers' requirements to leave their practices and reduce the financial burden of gaining mandatory continuing education credits. In 20 months of operation, 143 educational programs of all types were conducted over the network. There were approximately 4,000 attendees at all programs with 900 rural participants. These programs ranged from one and a half day primary care symposium and a full day Disorders of the Spine program for physicians, to general health education to the public in topics such as sleep disorders, Parkinson's peripheral nerve disease and cardiac problems in diabetes. There is overwhelming satisfaction by participants to receiving education offerings through videoconferencing.
- Telemedicine services has resulted in decreased costs and lost productivity associated with administrative and educational travel. It will decrease what we in eastern Montana call "windshield time" or what the Texas Telemedicine Program refers to as "salary spilled on the highway." By the same token, telemedicine does result in decreased overall costs to rural residents for accessing health care services by demonstrating savings in patient's time and travel expenses. These expenses, by the way, are not even considered in the national health care expenditure figures.
- In our experience, patients clearly benefit from telemedicine services. The patient travel time, mileage and associated meal and lodging expenses to seek a specialist consult in Billings as an alternative to a telemedicine consult were calculated for each community on our network. For a one year period of time, the total patient savings as a result of telemedicine mental health consults is estimated at close to \$100,000.
- The potential results of the non-medical applications include improved educational opportunities, enhanced communication between business associates and expanded market areas.

When we researched the prospect of telemedicine and the associated transmission cost in our rural environment, it was anticipated that medical applications alone would not create long term network viability. Since its implementation in September of 1993, the EMTN has been promoted by the participating sites as a community network (a vehicle for providing continuing education and telebusiness applications. For the first year of operations, the network was promoted to the participating communities for use, free of charge. In September 1994, the network began charging for non-medical applications over the network. A comprehensive marketing plan was developed which identified the primary value of the network for each of the network sites. In some communities, medical applications was the primary value. For others, the continuing education for their staff was of primary importance. Currently, the Network is generating approximately \$1000 per month in network charges from telebusiness. Plans are currently underway to increase that revenue to \$2000 per month. Telebusiness is an important source of revenue for each of the rural hospital who are paying their network transmission costs. They cannot absorb new costs into their overall budgets, therefore defraying a portion of the transmission costs through outside users has been our strategy.

There are several issues which I believe are distinct barriers to the implementation of telemedicine in all rural communities across the country. The cost of videoconferencing equipment continues to drop, however, it is still cost-prohibitive for the smallest rural facilities. Federal grant programs like the REA's, now RUS Distance Learning and Medical Link Program, and the Rural Hospital Transition Grant Program continue to be the best chances for these facilities to acquire this equipment. I encourage you to consider continued funding for these and similar programs.

The nation's telecommunications infrastructure needs continued improvement and telecommunications network costs need to be more affordable.

On the pricing side, lower rates—"public interest tariffs"—should be encouraged through marginal pricing standards. I want to acknowledge and endorse the language in the Snowe Rockefeller amendment of S. 652 which would allow some rate discounting for non-profit services like telemedicine, but encourage close Federal guidance to clarify the intent of this amendment.

I also believe the issue of reimbursement for telemedicine services must be addressed. The Health Care Financing Administration does not reimburse for direct patient care services provided by telemedicine to Medicare recipients except in a few selected telemedicine programs. Most third party insurers are following HCFA's lead. In Montana, Medicaid does reimburse for telemedicine consultations. They have historically paid for patient's travel costs and see the savings potential. It is safe to say that we will never convince physicians to provide consultative services over a technology that will decrease the number of patients that come to see them in their office, if they cannot be reimbursed for the consultation. I believe the overall cost of providing health care services will ultimately decrease if this technology is implemented on a national scale. But first, we must provide the motivation for that implementation. I would ask you therefore, to consider legislation mandating Medicare coverage for telemedicine services.

Because of the ability of the information superhighway to link seamlessly, a physician in one state and a patient in another, interstate credentialing has become an issue within telemedical circles. I urge the Federal government to push for a standardized credentialing process that allows reciprocity for telemedical consultations.

Mr. Chairman, members of the committee, thank you very much for this opportunity to share our experience on telemedicine.

Senator BURNS. Thank you very much, Ms. Wilson. I will say that ever since we started those projects Deaconess has been just a wonderful group to work with up there, and I congratulate them. When they put together the Network, we had our ups and downs and wrecks and everything else, but they kept a very positive attitude. You have just been a wonderful organization to work with; so I appreciate that.

James Ereaux, who teaches at Salish Kootenai College over at Pablo, Montana, which is over in the Flathead country. James, we appreciate you coming by today and offering your testimony with regard to the leveling effect that distance learning has and its tools to bring education, education technology to those Native Americans

that are living on our reservations. We appreciate you coming today. Thank you very much.

**STATEMENT OF JAMES D. EREAUX, DIRECTOR OF COMPUTING & TELECOMMUNICATIONS, SALISH KOOTENAI COLLEGE, PABLO, MONTANA**

Mr. EREAUX. Thanks, Mr. Chairman. Again, my name is Jim Ereaux. I'm Director of Computer Systems and Telecommunications at Salish Kootenai College. I have worked at the college for about 18 years off and on, full-time for about the last 10 as the computer director.

About 10 years ago when we started off we had, oh, about 8 or 10 microcomputers; now we've got 280 work stations, a gob of file servers, direct Internet connection, switched video, switched data, we're set up for ATM, satellite delivery and uplink, low-power UHF station, all kinds of Internet services, but very, very limited ways to get out of our local college, so what I'd like to address today are some of the problems Salish Kootenai College and other tribal colleges have connecting their resources to the outside world.

We have a number of initiatives that we work with the tribal colleges. Just to name a few, the big one for this year is the NSF grant which Senator Burns sponsored for Montana tribal colleges, which will have a very great effect on what we can do in the state.

There's an NSF grant, a Network Montana project from the University of Montana and MSU for Internet connectivity; there is the AISTEC Alliance with NASA; there is the telecommunications project for satellite delivery; there is the Alliance for Minority Participation; there is a Science and Technology Alliance for video conferencing; there is STEP,

AIRONET, and a host of others. We have at least 15 initiatives we're working on, and that's what has brought us to what we're trying to do today.

This last week I visited the Montana tribal colleges to see if their direction for telecommunications changed over the summer. As we talked about various initiatives and projects, the common statement by all can be summarized in one word—chaos. Tribal colleges are struggling to cope with the plethora of technologies proposed by countless consultants which promise to "slice-dice-chop" our way to technological nirvana. Out of the many solutions looking for a problem, we must find the tools which help us better educate our students.

The search for tools involves many different groups, including other education institutions, state, Federal and private funding agencies, telecommunication providers and technology suppliers. All these groups have different ideas about what will work the best both for themselves and tribal colleges.

Tribal colleges are an adventurous group, and when asked to sign up for these projects, do their best to gain some benefit from the work and fulfill their obligations. All too often, though, tribal colleges are a sidelight to larger and often unseen goals.

Most tribal colleges have a room full of unfulfilled technological promises: computers, modems, video units or telephony devices which purported to solve our at-distance education problems, but in fact were just marketing devices for another's profit.

In the classic case, a large university received a grant to supply technology for at-distance learning to tribal colleges. Out of several million dollars, the university pocketed over 70 percent in indirect costs, and the tribal colleges got 6 microcomputers, which were less than marginally useful.

We're still looking, working and hoping for these solutions. In the meantime what tribal colleges want are people and organizations who will listen and help them with compassion and understanding. They want and need solutions for real problems. A real problem is not how to get a full T-1 connection to the Internet, it's how to get basic communication.

In one tribal college community, there are only 2 unused telephone lines available, and at another it would cost in excess of \$1,000 per month to run a dedicated 56k data line to the nearest university for Internet connectivity.

The real problem is not how to get interactive video on each student's computer, but how to find and train just one skilled technician who knows something about networking and will work long hours for next to nothing on a reservation which is just about as far from Silicon Valley as a person can travel.

As the communication giants roll out ATM and other advanced data services, we hope for the day we'll receive equal access and be able to choose an alternative long-distance carrier. As urban residents use ISDN for interactive video meetings, we wonder if the local telcos will ever offer such basics as Switched 56. As 90 percent of U.S. residents get their software deliveries overnight, we wonder when Airborne will begin delivering parcels to our college more than twice per week.

The very attributes which hold us as a people to the grandeur of Montana also challenge the promises of technology. Low population density, low economic growth, lower income standards and lots of wide-open spaces are anathema to the workings of telecommunications.

Telecommunications technology needs bandwidth, and for that bandwidth you need lots of customers; to put in the path, you need customers; and to make it affordable, you need lots of customers. This is not to say that it can't be done; it will just be a very big challenge for us.

Many of our problems are rooted in ourselves. Montanans' independence and self-reliance are what make us unique and independent. When someone tells a Montanan he/she won't be able to do something, that's the first thing they try to do just to show we can. If someone tells a Montanan to do something a certain way, he/she will likely as not find another solution.

So, here we are with a state with over 26 independent telephone companies and just a handful of them cooperating on delivering their own version of advanced telecommunications. Most tribal colleges have eight separate telecommunication initiatives, almost all written by outside experts telling us what we need, all using eight different technologies to accomplish basically the same general task of at-distance education.

Tribal colleges are making a genuine and concerted effort to work with the different telcos, with the universities and with the Federal agencies to utilize at-distance education. We receive at



least several requests per week from outside agencies wanting us to connect with their own information service. If we honored all of these requests, our staff and faculty would spend most of their time on a computer and a modem reading electronic mail, and no time educating students.

It is almost at the point of overload for the tribal colleges. There are too many initiatives which are too different, too short and too small to really fix a particular problem. It's as though eight different groups have given us only half the pieces to eight different puzzles, and asked us to complete all eight puzzles. It's a challenge.

When an agency asks us to leverage resources, they need to remember that we have seven other agencies who want us to do the same thing but with seven different kinds of resources. Instead of eight small and varied grants, we need three large and concentrated grants. Instead of providing half a technician's salary for 3 years, we need a full salary for 5 years. Real problems require real solutions.

When a university comes to us and says they'll give us full Internet connectivity for 2 years, then after that you're on your own, it's a very shortsighted view of how reality works for tribal colleges. It may take 5 years to integrate the costs and build a technical base to maintain the service. Those few short words set us up for failure.

We don't need any more laws in Montana, we just have to grab hold of the ones we have and make them work. Our laws governing delivery of utility services were intentionally written years ago to stimulate competition and deliver services to the far reaches of Montana, but competition stopped when one utility's boundary met another.

Our situation today is one of potential competition, but more realistically, monopolies. Competition has stopped because of fear; fear that upsetting the economic balance will turn the tables and they'll risk losing their business.

Rural cooperatives don't have time to compete as they struggle to pick up the pieces after the departure of U.S. West from many exchanges in Montana. Local telcos struggle with the same problems as tribal colleges, coping with technology and finding or training skilled workers. Caught in the middle are the customers, the users who need the services to compete but may not be able to afford it, may not be able to buy it at any price.

Maybe now is the time we need to look at investing not just in technology but in technical education which will help workers understand the technology they're supplying to their customers. Maybe as a group we need to find ways to cooperatively find solutions instead of hunkering down in our little corners of the world.

Does it make sense that it's a long-distance call from Ronan to any point seven miles away? Does it make sense that the four independent telephone providers at the Flathead Reservation can't find a way to allow a customer to make an inexpensive call over the same distance as the greater Seattle local calling area? Does it make sense that every month for 3 years a rural telco promises that a tariff for switched data services has been filed with the PSC, but the PSC knows nothing about it?



Tribal colleges are doing their best to work cooperatively with the differing needs, sizes and capabilities of each institution. We have the American Indian Higher Education Consortium Telecommunications Project, which involves all 32 tribal colleges in North America.

It may not be the ultimate solution, but it's a cooperative attempt at at-distance education. We chose satellite technology because we couldn't find the cooperation, affordability or technical capabilities required among local telco providers to make the project a reality.

There are many future projects ahead of us, connection to the global Internet is just one. Telecommunication providers must find a way to provide basic digital service at an affordable price. Independent telephone companies need to become a little less independent and cooperatively work at educating themselves on important future technologies now, not tomorrow.

Telcos need to look at expanded area services, service compatibility and sharing of resources, or they risk being run over when the inevitable deregulation allows long-distance providers to go directly to the customer and bypass the local telco.

Government must realize that deregulation may spur telecommunication growth at the expense of affordability for basic telephone service in rural areas. The Public Service Commission either needs to take a leadership direction or move out of the way and let the free-for-all begin. Each Federal department, state agency or university must understand they're not the only agency promoting telecommunications.

In order for tribal colleges to serve our customers, the students, we need coordinated and genuine assistance from state and Federal agencies and telecommunication providers who claim us as their customers. We need less than eight different varieties of, "This is what you need to do," from universities, governmental agencies and technology providers, and a more coordinated, "What can we do to help you, our customer."

At tribal colleges, our customers are why we are here. If they're not happy, then we've failed to deliver our promises.

In conclusion, if positive and immediate changes do not take place, then Indians and rural Montanans in general won't even be hitchhikers on the information superhighway, they'll be relegated to spectators watching traffic from a distance.

[The prepared statement of James D. Ereaux follows:]

#### PREPARED STATEMENT OF JAMES D. EREAUX

##### Testimony Concerning At-Distance Learning in Montana

I would like to thank Senators Burns and Pressler and the Committee On Commerce, Science and Transportation for allowing me to testify about telecommunications on behalf of Montana Tribal Colleges. Tribal Colleges are much smaller and younger compared with other colleges and universities; but face similar, and often greater, challenges as we work with telecommunications and at-distance learning to help us accomplish our missions and objectives.

This past week I revisited the Montana Tribal Colleges to see if their directions for telecommunications changed over the summer. As we talked about the various initiatives and projects, the common statement made by all can be summarized in one word- "chaos." Tribal Colleges are struggling to cope with the plethora of technologies, proposed by countless consultants, which promise to "slice-dice-chop" our way to technological nirvana. Out of the many solutions looking for a problem we must find the tools which help us better educate our students.

The search for tools involves many different groups including other education institutions, State, Federal and private funding agencies, telecommunication providers and technology suppliers. All of these groups have different ideas about what will work best for both themselves and Tribal Colleges. Tribal colleges are an adventurous group and, when asked to sign up for these projects, do their best to gain some benefit from the work and fulfill their obligations. All too often, though, Tribal Colleges are a sidelight to larger and often unseen goals. Most Tribal Colleges have a room full of unfulfilled technological promises. Computers, modems, video units or telephony devices, which purported to solve our at distance education problems, but in fact were just marketing devices for another's profit. In the classic case a large university received a grant to supply technology for at-distance learning to Tribal Colleges. Out of several million dollars the university pocketed over 70% in direct costs and the Tribal Colleges got 6 microcomputers which were less than marginally useful.

We're still looking, working and hoping for these solutions. In the meantime, what Tribal Colleges want are people and organizations who will listen and help them with compassion and understanding. They want and need real solutions for real problems. A real problem is not how to get a full T-1 connection to the Internet, it's how to get basic communication. In one Tribal College community there are only 2 unused telephone lines available and at another it would cost in excess of \$1000 per month to run a dedicated 56K data line to the nearest university for Internet connectivity. A real problem is not how to get interactive video on each student's computer but how to find or train just one skilled technician who knows something about networking and will work long hours, for next to nothing, on a reservation which is about as far from the Silicon Valley as a person can travel.

As the communication giants roll out ATM and other advanced data services we hope for the day we'll receive equal access and be able to choose an alternative long distance carrier. As urban residents use ISDN for interactive video meetings we wonder if the local telcos will ever offer such basics as Switched 56. As 90% of U.S. residents get their software deliveries overnight we wonder when Airborne will begin delivering parcels to our College more than twice per week.

The very attributes which hold us as a people to the grandeur of Montana also challenge the promises of technology. Low population density, low economic growth, lower income standards and lots of wide-open spaces are anathema to the workings of telecommunications. Telecommunications technology needs bandwidth and for that bandwidth you need a path. To put in the path you need customers and to make it affordable you need lots of customers. This is not to say it can't be done, it will just be a very large challenge.

Many of our problems are rooted in ourselves. Montanan's independence and self-reliance are what make us unique and independent. When someone tells a Montanan he/she won't be able to do something, that's the first thing they try to do—just to show they can. If someone tells a Montanan to do something a certain way he/she will likely as not find another solution. So, here we are, a state with over 26 independent telephone companies and just a handful of them cooperating on delivering their own version of advanced telecommunications. Most Tribal Colleges have more than 8 separate telecommunication initiatives, almost all written by outside experts telling us what we need, all using 8 different technologies to accomplish basically the same general task of at-distance education. Tribal Colleges are making a genuine and concerted effort to work with the different telcos, with the universities and with the Federal agencies to utilize at-distance education. We receive at least several requests per week from outside agencies wanting us to connect with their own information service. If we honored all of these requests our staff and faculty would spend most of their time on a computer and modem reading electronic mail and no time educating students.

It is almost at the point of overload for Tribal Colleges. There are too many initiatives, which are too different, too short and are too small to really fix a particular problem. It's as though 8 different groups have given us only half the pieces of 8 different puzzles and ask us to complete all 8 puzzles. It's really a challenge. When an agency asks us to "leverage" resources they need to remember we have 7 other agencies who want us to do the same thing but with 7 different kinds of resources. Instead of 8 small and varied grants we need 3 large and concentrated grants. Instead of providing half of a technician's salary for 3 years we need a full salary for 5 years. Real problems require real solutions. When a university comes to us and says they'll give us full Internet connectivity for 2 years, then after that we're on your own, is a very shortsighted view of how reality works for Tribal Colleges. It may take 5 years to integrate the costs and build a technical base to maintain the service. Those few short words set us up for failure.

We don't need any more laws in Montana, we just have to grab hold of the ones we have and make them work. Our laws governing delivery of utility services were intentionally written years ago to stimulate competition and deliver services to the far reaches of Montana; but, competition stopped when one utility's boundary met another. Our situation today is one of potential competition but more realistically monopolies. Competition has stopped because of fear-fear that upsetting the economic balance will turn the tables and they'll risk losing their business. Rural co-operatives don't have time to compete as they struggle to pick up the pieces after the departure of U.S. West from many exchanges in Montana. Local telcos struggle with the same problems as Tribal Colleges, coping with technology and finding or training skilled workers. Caught in the middle are the customers—the users who need the services to compete but may not be able to buy it at any price.

Maybe now is the time we need to look at investing not just in the technology, but in technical education which will help workers understand the technology they are supplying to their customers. Maybe as a group we need to find ways to cooperatively find solutions instead of hunkering down in our own little corners of the world. Does it make sense that it's a long distance call from Ronan to any point seven miles away? Does it make sense that the four independent telephone providers on the Flathead Reservation can't find a way to allow a customer to make an inexpensive call over the same distance as the greater Seattle local calling area? Does it make sense that every month, for three years, a rural telco promises that a tariff for switched data services has been filed with the PSC but the PSC knows nothing about it?

Tribal Colleges are doing their best to work cooperatively, given the differing needs, sizes and capabilities of each institution. We have the American Indian Higher Education Consortium (AIHEC) Telecommunications Project which involves all 32 Tribal Colleges in North America. It may not be the ultimate solution, but it's a cooperative attempt at at-distance education. We chose satellite technology because we couldn't find the cooperation, affordability or technical capabilities required, among local telco providers, to make the project a reality.

There are many future projects ahead of us. Connection to the global Internet is just one. Telecommunication providers must all find a way to provide basic digital service at an affordable price. Independent telephone companies need to become a little less independent and cooperatively work at educating themselves on important future technologies now, not tomorrow. Telcos need to look at expanded area services, service compatibility and sharing of resources or they risk being "run over" when the inevitable deregulation allows long distance providers to go directly to the customer and bypass the local telco. Government must realize that deregulation may spur telecommunication growth at the expense of affordability for basic telephone service in rural areas. The Public Service Commission either needs to take a leadership direction or move out of the way and let the free-for-all begin. Each Federal department, State agency or university must understand they're not the only agency promoting telecommunications.

In order for Tribal Colleges to serve our customers, the students, we need coordinated and genuine assistance from State and Federal agencies and telecommunication providers who claim us as their customers. We need less of the 8 different varieties of "this is what you need to do" from universities, governmental agencies and technology providers and a more coordinated "what can we do to help you, our customer." At Tribal Colleges our customers are why we are here. If they're not happy then we've failed to deliver our promises.

If positive and immediate changes do not take place then Indians, and rural Montanans in general, won't even be hitchhikers on the "Information Superhighway," they'll be relegated to spectators watching traffic from a distance.

Senator BURNS. Thank you.

Laura Ford, thank you for coming. She represents U.S. West and she is Vice President of Public Policy. She travelled up here from Denver, Colorado. Laura, thank you for coming up this afternoon and sharing your information with us.

#### STATEMENT OF LAURA D. FORD, VICE PRESIDENT-PUBLIC POLICY, U.W. WEST COMMUNICATIONS, DENVER, COLORADO

Ms. FORD. Thank you, Mr. Chairman.

All of us here want to see the timely development of the National Information Infrastructure, benefiting Americans wherever they may live.

I doubt that many people today in Montana or elsewhere have ever heard the term "NII," and while most Americans have heard of the information superhighway, there seems to be no common understanding of what it means. Some people think of it only in terms of the Internet or of 500 channels of video programming, and yet the NII by whatever name is an idea whose time has come.

Millions of Americans are already predisposed to support it, thanks to their direct experience with business and library networks, the Internet, and other tools of the Information Age.

They already know the value of having ready electronic access to useful information wherever they work, live, learn or play.

They recognize that their personal success in schools and the workplace, and their state's and region's and the nation's success in global markets increasingly will hinge on the availability of advanced data networks linking remote or dispersed information resources.

Coming to the topic of today's hearing, I believe these millions of Americans, without needing to look very far into the future, would agree that assuring rural communities effective network access to remote information resources will not only be a matter of equity, but of economic survival for such communities.

My comments today will offer U.S. West's perspective on three main points: First, my company's continuing role in serving rural communities; second, the importance of pending Federal telecommunications reform legislation to NII development; and third, the role of community of interest networks and market forces in promoting NII development.

Since our 14-state service region by any measure is by far the most rural of any regional Bell operating company's,

U.S. West has a considerable stake in the question of rural NII development.

The U.S. West region stretches from the Mississippi to the Puget Sound, and from the Mexican border to the Canadian border. It includes 42 percent of the continental United States land mass, but only about 10 percent of the nation's population.

Our region encompasses twice the geographic area of the next largest RBOC, but has the lowest population density per square mile and the lowest average number of access lines per square mile, that is, 27 lines per square mile; therefore, rural markets have been and will remain a significant part of U.S. West's telecommunications business.

In recent years the company has sold or offered to sell or trade selected very low-density rural exchanges which were within the community of interest of independent telephone companies, and which these companies, with their access to low-cost capital, could serve more cost-effectively. Yet the transfer of all 330,000 rural access lines offered would still account for only 9 percent of U.S. West's 3-1/2 million rural access lines.

Even with the possibility of other selected offerings, we expect to continue serving the remainder, which by any account will be a substantial rural market. Over the next 5 years, the company expects to invest \$2 billion in upgrading service to our rural exchanges.

What's more, rural demand for telecommunication services continues to grow throughout the U.S. West region. In eight of the company's westernmost states, including Montana, rural demand for access lines actually grew at a faster rate than urban demand.

There are at least two major contributors to this trend. The first is simple migration, a steady population flow over the past several years to small towns from urban centers located both within our region and beyond.

Migrants include the so-called "lone eagles," who are self-employed in the information economy. Add to them the retirees and the "Rebound Forty-niners," disappointed Californians heading east. Many of these migrants come seeking rural settings with urban amenities, including telecommunications access, education opportunities and satisfactory health care.

The other driver of rural service growth has been demand for more lines per customer. These are needed to support fax machines, modems and other information technology.

As many in this room know, the combined effect of this demand in some localities was to quickly exhaust spare customer loop facilities and cause sometimes major delays in our ability to respond to this continued growth.

These spurts in demand, exasperating as they have been for us and our customers, further illustrate that rural markets continue to be an important business concern for us. We expect growing rural demand over time for more advanced services. Consequently, we want to support the public policy climate most likely to promote the timely and economic development of the NII throughout our region.

This leads me to my second point, NII and Federal telecommunications reform.

We believe the surest way to foster NII deployment nationally and in every state we serve is through Federal and state telecommunications reform measures which open all markets to all competitors on the same terms and timetables.

As members of this subcommittee know, both chambers of Congress have adopted by substantial margins reform bills intended to promote open markets. The legal barriers between provider categories would be removed, enabling cable TV companies, local and long-distance service carriers and providers of cellular and new wireless services to compete in each other's businesses, with few exceptions.

In coming weeks a Congressional conference committee will have the opportunity to combine the best of both bills so as to assure fair competition, rather than protect any given class of competitor. Some competitors will be working to delay this effort or to seek to give themselves a head start in the local service marketplace.

But Congress has the opportunity to finish 'his job of enacting pro-competitive, pro-consumer telecommunications reform. We hope members of the conference committee will proceed without delay to adopt the fair balance of policy interests already endorsed in both houses of Congress.

We have a friendly fly at this table, and he finds the one that is speaking, I'm afraid, so excuse me.



However, NII benefits in the current legislative framework will flow not only from the equal competitive footing just described, but other measures as well. Conferees from both House and Senate are widely expected to endorse the Snowe-Rockefeller amendment or its House counterpart. Both are designed to promote the deployment of advanced telecommunications services to the nation's public schools, libraries and rural health care facilities, at discounted rates.

Under this new version of universal service, telecommunications customers nationwide would indefinitely subsidize through their bills the cost of connecting and serving the advanced telecommunications needs of these local government and private institutions.

To me it is ironic that a telecommunications reform measure which aims to substitute fair and robust competition for traditional regulation would nevertheless burden the marketplace with a new and apparently permanent layer of government regulation and artificial pricing mechanisms.

I am also concerned that the Senate bill in defining advanced services as, quote, "broadband services," unquote, virtually dictates a technology solution instead of allowing the marketplace to respond to advances in technology, and to discover over time what bandwidths are cost-effective and satisfactory for different customer groups.

Government predictions about the future course of technology have not proven to be a reliable substitute for the test of the marketplace. Years ago the FCC ordered TV makers to install UHF technology in every set, a mandate which the marketplace later proved to be wasteful and a needless cost to American consumers. Fortunately, the Federal Government never mandated eight-track tape players or a host of other evolving technologies.

Several of the large telephone companies including U.S. West have recently announced that they are exploring alternative technologies for delivering communications, information and entertainment to our customers, including wireless and satellite technologies.

In adopting any of these alternatives, the private sector assumes the risk of predicting the direction in which tomorrow's NII technology and marketplace will actually evolve. With all due respect, Mr. Chairman, I must question whether Congress knows enough about the future course of NII technology or markets to declare in Federal law that broadband connections would be the right answer for all schools, libraries or others. Rather than mandate a broadband standard, Congress should let the marketplace work.

Aside from those concerns, however, I agree that the provisions of Snowe-Rockefeller or its House counterpart would help to accelerate the deployment of advanced service connections to all public schools, libraries and rural health care facilities, and thereby would provide America's rural communities with a technology foundation on which the NII could evolve.

Finally, Mr. Chairman, I would comment on the role of community of interest networks and market forces in promoting NII development.

The NTIA publication "Common Ground" takes note of the far-flung electronic communities of interest which tend to emerge once

there is widespread access to advanced network and information technology.

I would suggest that some established communities of interest, for example, public and higher education, offer state and local policymakers compelling economic and political drivers for successful initial deployment of NII technology.

In this regard, the Montana state government is to be commended for moving forward with its SummitNet plan for a state-wide data network. By establishing Frame Relay Service links between higher education campuses and state government offices in every county seat, SummitNet will assure that Montana's schools, businesses and citizens will have an advanced digital technology backbone available statewide to carry other useful NII applications.

Eventually, it will enable Montanans to use telecommunicating and eventually videc conferencing so as to reduce building costs, traffic congestion and motor vehicle pollution; use telemedicine to enhance Montana's access to health care services by enhancing remote communications between providers and patients, providing better care to more people at lower cost; facilitate citizen transactions with government agencies, such as driver's license renewals from any location in the state; and provide increased remote applications for businesses both large and small.

SummitNet's development has relied upon foresight and market forces, with the state government and educators working with the telephone industry to design a network that meets their needs.

Turning to the role of more specific market forces,

Montana offers several good examples of how the entry of new players into markets traditionally serviced by only one or a few companies can jump-start the development of the NII.

Unlike most states, Montana never has required monopoly franchised areas for telephone companies. Consequently, some of the independent telephone companies here in the state of Montana have been able to provide advanced services to schools in U.S. West's operating area.

For example, the Mid-Rivers and Range telephone companies in southeastern Montana are linking their areas' schools with fiber which they are also burying to a higher education campus in Billings, an area which has historically been served by U.S. West.

Likewise, five independents are jointly building a video distance learning network which will extend to Northern Montana College and a grade school in Havre which U.S. West serves, and also down to a satellite campus in Great Falls, which U.S. West also serves.

New players are also entering Montana's telecommunications market. TCI has already extended a Local Area Network interconnection service between Saint Patrick's Hospital in Missoula and smaller rural hospitals in the Bitterroot and Flathead areas, as a part of their announced plan, to provide advanced telecommunication services to educational institutions.

TCI also has proposed to provide a LAN interconnection link between the University of Montana and five school districts. We expect upon successful completion of these pilot programs, TCI will offer this service to other customers early next year.

These Montana examples provide an early indication of how NII development will be stimulated when all markets, local telephone service, cable service, long-distance and wireless communications and information services are opened to all interested providers.

In closing, I congratulate the Montana Telecommunications Advisory Council for having won passage this year of legislation establishing the Blue Ribbon Telecommunications Task Force to promote the most favorable possible competitive climate for NII development in this state. In taking this important step, Montana is clearly in league with the future.

Thank you, Mr. Chairman.

[The prepared statement of Laura D. Ford follows:]

## EXECUTIVE SUMMARY

Testimony of Laura D. Ford  
Vice President-Public Policy  
U S WEST Communications  
before the U. S. Senate Subcommittee  
on Commerce, Science and Transportation  
October 1, 1995, field hearing  
in Billings, Montana

1. NII is an idea whose time has come. We expect the public will both support it and consider its availability to rural communities as a matter of both equity and rural economic survival.
2. As the Regional Bell Operating Company with the largest geographic region and lowest population density, U S WEST expects rural markets to remain a significant part of its telecommunications business. The company's recent sale of, and offers to sell, selected, very low-density rural exchanges to independent companies with capital structures better suited to serving in them, will not significantly diminish the number of access lines in U S WEST's overall rural market.
3. In proposing to open all markets to all competitors on equal terms and timetables, pending federal telecommunications reform bills offer the surest way to foster timely national and state NII development. The conference committee preparing to reconcile S 652 and H.R. 1555 should proceed without delay and should preserve the parity of competitive entry overwhelmingly endorsed in both chambers.
4. Rural NII development would be accelerated by provisions in both bills designed to promote advanced services deployment at discounted rates to public schools and libraries and to rural health care facilities. However, Congress should avoid dictating in federal law technology standards which could preempt more cost-effective future solutions or favor current guesswork over actual customer preferences in tomorrow's market. Therefore, enactment of S 652's requirement of a "broadband" connectivity standard for advanced services would be a disservice to NII's vision and goals.

5. The information needs of certain established communities of interest offer state policymakers compelling political and economic drivers for rapid statewide NII deployment. Montana's leaders deserve commendation for underwriting the anchor tenancy of a statewide government data network whose infrastructure can eventually benefit all sectors of Montana's economy.
6. Montana examples of the important role open market forces will play in NII development include competitive initiatives by independent telephone companies and cable TV providers to serve the education and health care markets.



Testimony of Laura D. Ford  
Vice President-Public Policy  
U S WEST Communications  
before the U. S. Senate Subcommittee  
on Commerce, Science and Transportation  
October 1, 1995, field hearing  
in Billings, Montana

Thank you, Senator Burns, for the opportunity to join this important discussion.

All of us here want to see the timely development of a truly National Information Infrastructure, benefiting Americans wherever they may live.

I doubt that many people today, in Montana or elsewhere, have ever heard the term "NII." And while most Americans have heard of the information highway, there seems to be no common understanding of what it means. Some people think of it today only in terms of the Internet, or of 500 channels of video programming.

And yet, the NII by whatever name is an idea whose time has come. Millions of Americans are already predisposed to support it, thanks to their direct experience with business and library networks, the Internet, and other tools of the Information Age.

They already know the value of having ready electronic access to useful information wherever they work, live, learn, or play.

They recognize that their personal success in schools and workplaces, and their state's and region's success in global markets, increasingly will hinge on the availability of advanced data networks linking remote or dispersed information resources.

Coming to the topic of today's hearing, I believe these millions of Americans, without needing to look very far into the future, would agree that assuring rural communities effective network access to remote information resources

will not only be a matter of equity, but of economic survival for such communities.

My comments today will offer U S WEST's perspective on three main points:

1. My company's continuing role in serving rural communities;
2. The importance of pending federal telecommunications reform legislation to NII development; and
3. The role of community of interest networks and market forces in promoting NII development.

#### 1. U S WEST Communications as rural services provider

Since our 14-state service region, by any measure, is by far the most rural of any Regional Bell Operating Company's, U S WEST has a considerable stake in the question of rural NII development.

The U S WEST region stretches from the Mississippi River west to Puget Sound, and from the Mexican border north to the Canadian borders. It includes 42 percent of the continental United States land mass, but only about 10 percent of the nation's population.

Our region encompasses twice the geographic area of the next largest RBOC, but has the lowest population density per square mile<sup>1</sup> and the lowest average number of access lines per square mile (27 lines per square mile).

Therefore rural markets have been, and will remain, a significant part of U S WEST's telecommunications business.

In recent years the company has sold or offered to sell or trade selected very low-density rural exchanges which were within the community of interest of independent telephone companies and which these companies, with their access to low cost capital, could serve more cost-effectively. Yet the transfer of all 330,000 rural access lines offered would still account for only 9 percent of the U S WEST's 3.5 million rural access lines. Even with the possibility of other selected offerings, we expect to continue serving the remainder, which by any account will be a substantial rural market. Over the next five years, the company expects to invest \$2 billion in upgrading service to our rural exchanges.

<sup>1</sup> See Exhibit 1, "USA 1990 Population Density by County."

What's more, rural demand for telecommunications services continues to grow throughout the U S WEST region. In eight of the company's westernmost states, including Montana, rural demand for access lines actually grew at a faster rate than urban demand.<sup>2</sup>

There are at least two major contributors to this trend.

The first is simple migration: a steady population flow over the past several years to small towns from urban centers located both within our region and beyond. Migrants include the so-called lone eagles, who are self-employed in the information economy. Add to them the retirees and Rebound Forty-niners -- disappointed Californians heading east. Many of these migrants come seeking rural settings with urban amenities, including telecommunications access, education opportunities and satisfactory health care.

The other driver of rural service growth has been demand for more lines per customer, needed to support fax machines, modems and other information technology.

As many in this room know, the combined effect of this demand in some localities was to quickly exhaust spare customer loop facilities and cause sometimes major delays in responding to continued growth.

These spurts in demand, exasperating as they have been for us and our customers, further illustrate that rural markets continue to be an important business concern for us. We expect growing rural demand over time for more advanced services. Consequently, we want to support the public policy climate most likely to promote the timely and economic development of the NII throughout our region.

## 2. NII and federal telecommunications reform

We believe the surest way to foster NII deployment nationally and in every state we serve is through federal and state telecommunications reform measures which open all markets to all competitors on the same terms and timetables.

As members of this subcommittee know, both chambers of Congress have adopted by substantial margins reform bills intended to promote open

<sup>2</sup> Utah, Colorado, Arizona, New Mexico, Oregon, Washington, Wyoming, and Montana. See Exhibit 2, "Changing Trends in Rural Markets."

markets. The legal barriers between provider categories would be removed, enabling cable TV companies, local and long distance service carriers and providers of cellular and new wireless services to compete in each others' businesses, with few exceptions.

In coming weeks a Congressional conference committee will have the opportunity to combine the best of both bills so as to assure fair competition, rather than protect any given class of competitor. Some competitors will be working to delay this effort, or to seek to give themselves a head start in the local service marketplace. But Congress has the opportunity to finish the job of enacting pro-competitive, pro-consumer telecommunications reform. We hope members of the conference committee will proceed without delay to adopt the fair balance of policy interests already endorsed in both houses of Congress.

NII benefits in the current legislative framework will flow not only from the equal competitive footing just described, but other measures as well. Conferees from both House and Senate are widely expected to endorse the Snowe-Rockefeller amendment or its House counterpart, the Orton-Ney-Morella amendment. Both are designed to promote the deployment of advanced telecommunications services to the nation's public schools, libraries and rural health care facilities, at discounted rates.

Under this new version of universal service, telecommunications customers nationwide would indefinitely subsidize through their bills the cost of connecting and serving the advanced telecommunications needs of these local government and private institutions.

To me it is ironic that a telecommunications reform measure which aims to substitute fair and robust competition for traditional regulation would nevertheless burden the marketplace with a new and apparently permanent layer of government regulation and artificial pricing mechanisms.

I am also concerned that the Senate bill, in defining advanced services as "broadband services," virtually dictates a technology solution instead of allowing the marketplace to respond to advances in technology, and to discover over time what bandwidths are cost-effective and satisfactory for different customer groups.

Government predictions about the future course of technology have not proven to be a reliable substitute for the test of the marketplace. Years ago, the FCC ordered TV makers to install UHF technology in every set, a mandate which the marketplace later proved to be a wasteful and needless cost to American consumers. Fortunately, the federal government never mandated eight-track tapes or a host of other evolving technologies.

Several of the large telephone companies including U S WEST have recently announced that they are exploring alternative technologies for delivering communications, information and entertainment to our customers including wireless and satellite technologies.

In adopting any of these alternatives, the private sector assumes the risk of predicting the direction in which tomorrow's NII technology and marketplace will actually evolve. With all due respect, Mr. Chairman, I must question whether Congress knows enough about the future course of NII technology or markets to declare in federal law that broadband connections will be the right answer for all schools, libraries, or others. Rather than mandate a broadband standard, Congress should let the marketplace work.

Aside from those concerns, however, I agree that the provisions of Snowe-Rockefeller or its House counterpart would help to accelerate the deployment of advanced service connections to all public schools, libraries and rural health care facilities, and thereby would provide America's rural communities with a technology foundation on which the NII could evolve.

### 3. The role of community of interest networks and market forces in NII development

Finally, Mr. Chairman, I would comment on the role of community of interest networks and market forces in NII development.

The NTIA publication "Common Ground" takes note of the far-flung electronic communities of interest which tend to emerge once there is widespread access to advanced network and information technology.

I would suggest as well that some established communities of interest -- for example, public and higher education -- offer state and local policy makers compelling economic and political drivers for successful initial deployment of NII technology.

In this regard, the Montana state government is to be commended for moving forward with its SummitNet plan for a statewide data network. By establishing Frame Relay Service links between higher education campuses and state government offices in every county seat, SummitNet will assure that Montana's schools, businesses and citizens will have an advanced digital technology backbone available statewide to carry other useful NII applications. Eventually it will enable Montanans to:



- Use telecommuting and, eventually, video conferencing so as to reduce building costs, traffic congestion and motor vehicle pollution;
- Use telemedicine to enhance Montana's access to health-care services by enhancing remote communications between providers and patients, providing better care to more people at lower cost;
- Facilitate citizen transactions with government agencies, such as drivers' license renewal from any location in the state;
- Provide increased remote applications for businesses both large and small.

SummitNet's development has relied upon foresight and market forces with the state government and educators working with the telephone industry to design a network that meets their needs.

Turning to the role of market forces, Montana offers several good examples of how the entry of new players into markets traditionally served by only one or a few companies can jump-start the development of the NII.

Unlike most states, Montana never has required monopoly franchised areas for telephone companies. Consequently, some of the independent telephone companies here have been able to provide advanced services to schools in U S WEST's operating area.

For example, the Mid-Rivers and Range telephone companies in southeastern Montana are linking their area's schools with fiber which they are also burying to a higher education campus in Billings, an area historically served by U S WEST.

Likewise, five independents are jointly building a video distance learning network which will extend to Northern Montana College and a grade school in Havre, which U S WEST serves, and also down to a satellite campus in Great Falls, which U S WEST also serves.

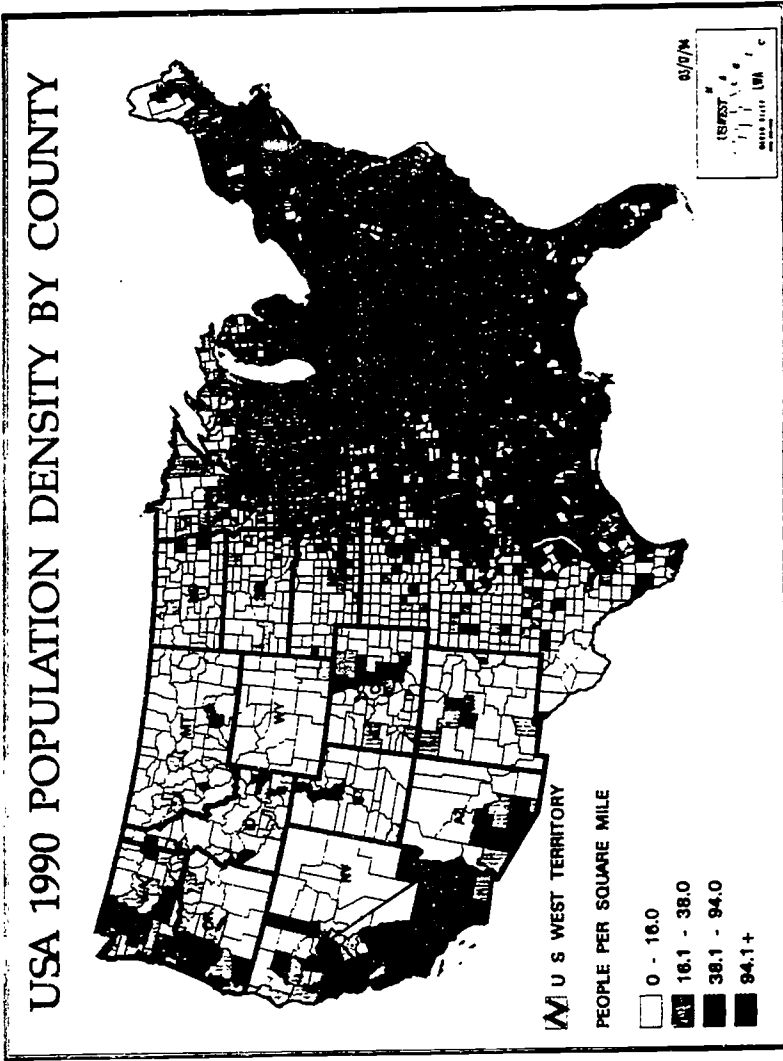
New players are also entering Montana's telecommunications market. As a part of their announced plan to provide advanced telecommunications services to educational institutions, TCI has already extended a Local Area Network (LAN) interconnection service between Saint Patrick's Hospital in Missoula and smaller rural hospitals in the Bitterroot and Flathead areas. It has also proposed a pilot project to provide a (LAN) interconnection link between the University of Montana and five school districts. We expect that upon successful completion of these pilots, TCI will offer this service to other customers early next year.

These Montana examples provide an early indication how NII development will be stimulated when all markets-- local telephone service, cable service, long distance, wireless communications, and information services--are opened to all interested providers.

In closing, I congratulate the Montana Telecommunications Advisory Council for having won passage this year of legislation establishing the Blue Ribbon Telecommunications Task Force to promote the most favorable possible competitive climate for NII development. In taking this step, Montana is clearly in league with the future.

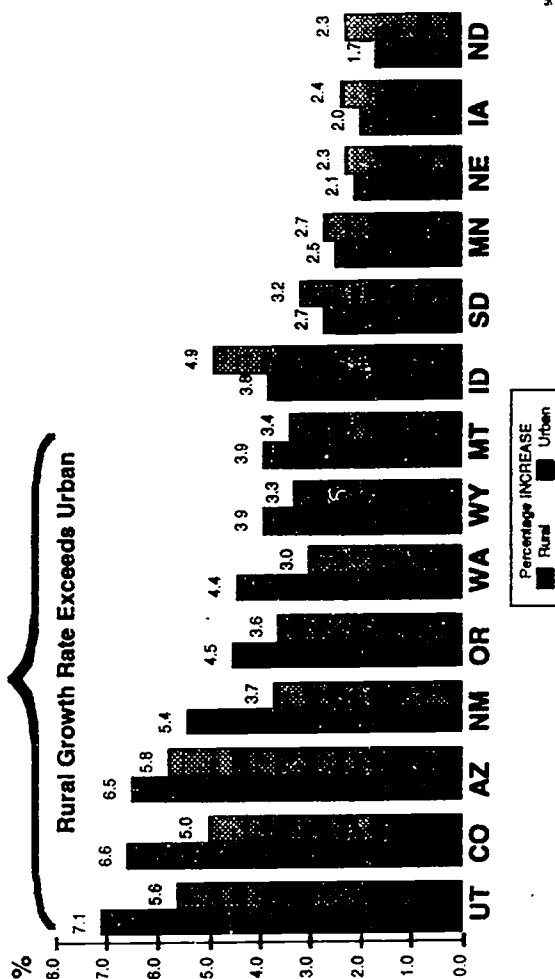
Thank you, Mr. Chairman.

## USA 1990 POPULATION DENSITY BY COUNTY



## Changing Trends in Rural Markets

Annual Growth Rate in Access Line Demand  
U S WEST Region - 1993 & 1994 Average



Senator BURNS. Thank you, thank you.

And now we will hear from Bill Poulos, who is with EDS, in charge of their technology and technology policy. Bill, thanks for coming out this afternoon. I appreciate that.

**STATEMENT OF WILLIAM N. POULOS, MANAGER,  
TECHNOLOGY POLICY, EDS CORPORATION, WASHINGTON, D.C.**

Mr. POULOS. Thank you, Mr. Chairman, and thank you for announcing the winner of the big game. Now I know it exists.

Senator BURNS. It is a disease.

Mr. POULOS. I'm pleased to be here today to discuss issues related to the NII. As Larry Irving so appropriately said, the NII is going to be built by private companies, not only in the United States but around the globe, and EDS plans on being one of those major developers of the NII.

EDS has operations in 36 countries, we employ over 85,000 people, and operate the world's largest private network.

What will the NII look like in Montana, say, by the year 2000? In recent years, there has been substantial discussion of what the information highway will look like. In the year 2000, Montana citizens can expect to see digital interactive networks with data streaming to them and from them through high-speed fiber and coax systems.

I think that we'll begin to see the benefits of open systems architectures, which will allow greater compatibility between all of these converging technologies: wireless, cable, broadcast television, telecommunications and computing. In Montana, the most significant change will likely occur with ubiquitous wire services, or I should say wireless services and direct satellite broadcasts to the home, school or business.

All of these technologies will, of course, change the face of the marketplace that we all know. For small businesses and manufacturers, the information highway provides an enormous technology enabler that will allow small businesses, to compete equally with larger, global firms.

The information highway will allow small businesses to get closer to their customers and suppliers who may be hundreds or even thousands of miles away. In a networked, information-rich society, the greatest benefit will go to those businesses who can leverage information technologies to generate new customers, create new markets and provide products and services far beyond their local sphere of reach.

Small businesses will have access to better research data or census data to target marketing efforts to where they have the greatest leverage. Small businesses need the same access to a highly skilled, educated work force that large businesses need.

The information highway can extend the reach of remote business, small businesses, to highly skilled employees that may live in other parts of the country, or even in other nations. Of course, the reverse is true. With a highly skilled work force in Montana, they can also have access to jobs and to businesses far outside of the borders of Montana.

As financial institutions incorporate information technology to extend their reach to their customers, small business will have



easier access to capital to fuel growth. A small businessman's neighborhood bank could well be on the other side of the state or even the other side of the country.

In short, the information superhighway will create an opportunity for Montana's small businesses to connect to customers and suppliers down the street or around the globe. Technology can span geographical, cultural and organizational boundaries to enable small business to mass-customize their product or service.

Just as the information superhighway will bring businesses closer to their customers and suppliers, so too will state and local governments be able to serve their constituents better. Imagine how much closer government will be to the people when a Montana citizen can log on to a network and track a bill running through the legislature.

Every citizen or business can have real time access to legislative or regulatory information. Every citizen can be his own lobbyist, to participate in the democratic process directly and instantly through E-mail letters to his legislator or his Governor.

I might say, Larry Irving has led the way in this area, and I think he was the first to hold a nationwide hearing on line. He's certainly to be commended for demonstrating the power of technology to bring people closer to their government.

The information superhighway will allow Federal, state and local agencies to streamline and coordinate the delivery of services to Montana citizens. In human services, for example, "Electronic Benefits Transfer" can enable the delivery to qualified Montanans for services provided under AFDC, food stamps, Medicare, Medicaid, nutrition or energy assistance.

The information highway will make the collection of taxes easier for state and local governments, and for the citizens when it can be done electronically. Tax cheats and deadbeat dads who don't pay court-ordered child support can also find it more difficult when state and local agencies can collect, connect electronically to employers' payroll data anywhere in Montana, or even in other states.

There is no technical reason that prevents Montana state and local agencies from being able to link with agencies in other states or the Federal Government for the smooth delivery of services.

We expect that advanced use of information technology will improve the government's ability to fight crime and reduce fraud in government programs. EDS has designed and runs the nation's largest fingerprint imaging operation in Los Angeles County, where law enforcement officials use computers to match fingerprints.

Mug shots will move over wires or through the airwaves from central data bases to where police need them in local offices or at the scene of a crime. A highway patrol officer will be able to have real-time access to county, state or even Federal crime-related data from his patrol car for everything from an unpaid parking ticket to the FBI's top Ten Most Wanted list.

The information superhighway can also provide the means for state and local governments to reduce the cost of government by applying electronic commerce technology to contracting and procurement of goods and services. Electronic processing of billing and payment information with state vendors will reduce the costs for both government and the contractors.

EDS stands ready to work with you, Mr. Chairman, and the people of Montana to shape policies that will ensure success in building the NII of the future. We applaud your efforts to examine these important issues here in Montana.

Thank you.

[The prepared statement of William N. Poulos follows:]

Testimony of  
EDS Corporation  
on the

Uses of the  
National Information Infrastructure

Before the  
Science, Technology, and Space Subcommittee  
Committee on Commerce, Science, and Transportation  
United States Senate

by  
William N. Poulos  
Manager, Technology Policy

October 1, 1995

I am pleased to be here today to discuss issues related to the National Information Infrastructure or what is commonly referred to as the "NII." First, let me compliment you on holding this hearing in Montana. There is no better backdrop for this hearing than the vastness and beauty of Montana, where the benefits of the Information Age can be implemented to empower Montana residents, businesses and government agencies to create a better life for people, with more competitive businesses, that create more jobs, and with better government services to all.

Since EDS will be one of the major developers of the National Information Infrastructure, we appreciate the opportunity to be here today to represent our ideas and vision for the future.

EDS has operations in 36 countries, employs more than 80,000 people and is the leader in applying information technology to meet the needs of businesses and governments worldwide. Stock reflecting EDS' performance is traded on the New York Stock Exchange under the symbol GME. EDS reported revenues of \$10.05 billion in 1994.

What will the NII look like in Montana by the year 2000?

In recent years there has been substantial discussion of what the information highway will look like. Many visionaries have placed their thoughts into the public record through regulatory filings, management speeches, and media speculation. Some of EDS's

visionaries have taken a stab at this and I would like to share some of those thoughts with you today.

In the year 2000, Montana citizens can expect to see digital interactive networks, with data streaming to them through high speed fiber-coax systems to their neighborhoods.

We will begin to see the benefits of open system architectures which will allow greater compatibility between all the converging technologies: wireless, cable, broadcast television, telecommunications and computing. The most significant change will likely occur with ubiquitous wireless services and direct satellite broadcasting to the home or business.

All of these technologies will also change the face of the marketplace we all know. Mass market penetration of U.S. households with network-based, interactive-broad-band-multimedia products and services will create new services for people where they live and work. Although the roll out of all these interactive services will create new business opportunities for entrepreneurs, it will be a highly competitive environment.

We expect to see some adverse economic effects in existing established industries, such as movie theaters, broadcast television, video rentals, retail software, print-based publications, etc., but the benefits and opportunities will far outweigh the temporary effects of



this shifting from an Industrial Age model to the Information Age model.

In the Industrial Age we used a classical model that had been intact for nearly a century. This model was characterized by the basic flow of products and services from the manufacture, through a distributor, to a retailer, who sold the product to the consumer. The products were in effect, "pushed" to the customer.

In the Information Age, a new industry model has begun to emerge which is characterized by a demanding, sophisticated market of *individuals* who want products and services customized to their specific needs.

Where the industrial age *pushed* its products to the masses, the Information Age will have products and services *pulled* by individuals with the tools and made possible by the information superhighway.

For small businesses and manufacturers, the information highway provides an enormous technology enabler that will allow small businesses to compete equally with very large, global firms. The information highway will allow small businesses to get closer to their customers, who may be hundreds or thousands of miles away. In a networked, information rich society, the greatest benefit will go to those businesses who can leverage information technologies to

generate new customers, new markets and provide products and services far from their local sphere of reach.

Small business will have access to better research data to target marketing efforts to where they have the greatest leverage. Small business needs the same access to a highly skilled, educated work force as does big business. The information highway can extend the reach of remote small business to highly skilled employees that may live in other parts of the country or even other nations. As financial institutions incorporate information technology to extend their reach to their customers, small business will have easier access to capital to fuel growth. A small businessman's neighborhood bank could well be on the other side of the state or the country.

In short, the information superhighway will create the opportunity for Montana small business to connect to customers and suppliers down the street or around the globe. Technology can span geographical, cultural, and organizational boundaries to enable small business to mass-customize their products and services.

Just as the information superhighway will bring businesses closer to their customers and suppliers, so will state and local governments be able to serve their constituents better. The "pull model" works well for government services in many ways.

Imagine how much closer government will be to the people when any Montana citizen can log on to a network and track a bill moving

through the legislature. Every citizen can have real time access to legislative or regulatory information. Every citizen can be his own lobbyist, to participate in the democratic process, directly and instantly through email letters to his legislator or governor.

The information superhighway will allow federal, state and local agencies to streamline and coordinate the delivery of services to Montana citizens. In human services, for example, "Electronic Benefits Transfer" can enable the delivery to qualified Montanans, the services provided for under AFDC, food stamps, Medicare, Medicaid, nutrition or energy assistance.

The information highway will make the collection of taxes easier for state and local governments, and for the citizen, when it can be done electronically. Tax cheats and deadbeat dads who don't pay court ordered child support, will also find it more difficult when state and local agencies can connect electronically to employer's payroll data anywhere in Montana or even other states. There is no technical reason that prevents Montana state and local agencies from being able to link with agencies in other states or the federal government for the smooth delivery of services.

We expect that advanced use of information technology will improve the government's ability to fight crime and to reduce fraud in government programs. EDS designed and runs the nation's largest finger imaging operation in Los Angeles County, where law enforcement officials use computers to match prints. Mug shots will

**BEST COPY AVAILABLE**

60

move over wires or through the airwaves from central data bases to where police need them in local offices or at the scene of a crime. A highway patrol office will be able to have real time access to county, state or even federal crime-related data from his patrol car for everything from an unpaid parking ticket to the FBI's ten most wanted list, with photos.

Can you imagine *not* having to drive long distances and *not* standing in line at the Department of Motor Vehicles to buy a new license plate or to take the written drivers test every 2 or 3 years? Can you imagine a Montana resident taking his written test on-line from his home in the city or on a remote ranch? When the test is complete, the necessary fees can be paid instantly with an electronic funds transfer from the customer's bank account to the state DMV account. The information highway can't replace the mandatory behind-the-wheel drivers test, but it can certainly take the bureaucratic sting out of delivering many routine services.

The information superhighway can also provide the means for state and local governments to reduce the cost of government by applying electronic commerce technology to contracting and procurement of goods and services. Electronic processing of billing and payment information with state vendors will reduce cost for both the government and the contractors.

As I close I also want to mention three issues of importance to policy makers at all levels of government. All of the wonderful possibilities

of the NII will never be realized and the societal benefits will not reach full potential until we deal effectively with some major policy issues related to privacy, security and intellectual property.

The issue of information privacy -- controlling access to and use of personally identifiable information as the world migrates from paper-based to digitized information -- will continue to be central to the development of an information superhighway. If the information superhighway allows business and government to invade the cherished privacy rights of US citizens, it will not be supported or well received.

In a digital world, all intellectual property (copyright, patent, and trade mark rights) becomes more susceptible to unauthorized distribution and duplication. If people can't get paid for placing their ideas, products, and services on national or global networks, they won't use it.

Lastly, businesses and individuals are demanding seamless webs of communications networks whereby information can flow in a free and *secure* manner. Making transactions secure on the Information Highway" is a high priority for all concerned.

EDS stands ready to work with you and the people of Montana to shape policies that will ensure success in building the national information infrastructure of the future. We applaud your efforts to examine these important issues. Thank you.



Senator BURNS. Thank you very much. We will get into the questioning now, and I have a few questions. I would say that I think with the group we have today, we could probably engage in a discourse where we could ask each other, because I think all of us have quite a lot to do with this business of policy, what policy we should pursue, where the government fits into some of this and where they shouldn't fit in.

I was struck by a new term coming from Bill Poulos today about the "ubiquitous wireless." Every now and again in these hearings, they always bring out some very new thoughts on the way we do things.

I want to start with Mr. Irving. Larry, I guess what we'll be dealing with as we go into conference on the new telecommunications bill, and I guess the conferees have been named now. I would imagine in the next couple of weeks you will see some movement about that conference.

It could be a conference that could go very fast or it could be a conference where it may take a while. It sounds like there is going to be a lot of people involved. We thought we were going to keep it small there for a little bit, but now there are quite a lot of folks, I understand.

When we talked about switched networks or when we talk about the NII, and I have said for a while now that the NII is out there, I think we could say not only is it out there as far as the telecommunications, the telephones, and the long-distance people, but I also think that right now you have an NII that is really further along in being developed through the cable companies and that great network.

What would the role of the government be, and when you got this information that you have here, did that change your mind on what the role of government should be in developing the National Information Infrastructure?

Mr. IRVING. No, not really. I think we have had a similar view, and I think this has helped to underscore that view. I think the view has been almost from conception that the government shouldn't build it; the government should develop policies, pro-competitive policies to assist other people in building it, and support the people that make the capital investments, who are willing to take the risk, with a certainty that the government is not going to change the policies and cost them their ability to give rewards to the shareholders.

What this has taught us a little bit about is, the marketplace by itself may not work in some rural areas for some applications.

What's going to work in Montana is going to be different from what works in Alaska, which is going to be different from what works in Pennsylvania, which I was surprised to find out is the nation's most rural state, actually, by some definitions.

So, in Pennsylvania, the rural solutions will need to meet certain requirements, while Montana is going to have different ones. I was just up in Alaska visiting Senator Ted Stevens' constituents. They're going to have different challenges because it's such a huge state, with even fewer people than Montana.

So, this Administration has had a consistent view. I have the same view I think as my bosses, which helps me keep my job, and

that is that the government should not build it, the government should just help lay the policy predicates, allow the private sector to build it, but where there are gaps, then we may need some government assistance.

We would not have telephone service of the quality we have in Montana without the help of the REA, without the help of enlightened state regulators, without the assistance of you, Senator Burns, in terms of what you've done on Native American reservations, and we were talking about the NSF grant that you gave.

So there is a balancing that has to be done.

Senator BURNS. So, if it had not been for REA—I have been around since the evolution of REA.

Ms. Ford, I was struck by your comments. I think you are right in some areas that the competition will be very keen. How do we address the rural areas? I am confident had it not been for REA, we would be watching television by candlelight. I have said that a lot of times. We would never have had electricity in rural areas had it not been for the Rural Electrical Administration.

Now that is not to say that some of them have outlived their usefulness, because now, I think, they can operate on their own without any kind of government subsidies.

How keen is the competition out here, and how does it help what Ms. Wilson wants to do?

Ms. FORD. I wouldn't say that the competition is keen in the rural areas, but I did give you a couple of examples where we're seeing the telephone companies go into each other's, what had been thought of as their operating area, to provide services to schools.

And also, as you indicated, TCI with their cable network which is marching forward and passes 60 percent of the households, including rural areas, that the cable companies are going to be competitors for the services in the rural areas.

But there are places where the marketplace may not always work perfectly, and we have to come up with the best solution, and we have to look, as Larry Irving has said, at different technologies to serve those areas. That's one of the reasons why we have such a concern about the use of the term "broadband," which our engineers say needs 45 megabytes, and simply may be for more than is needed, or, frankly, can be paid for in some of these areas.

Senator BURNS. Mr. Ereaux, you have been very active. You are over there and you have some concerns about it. Give me some suggestions on what should be done as far as a government-concerned policy in order to facilitate what you are trying to do on the reservations.

Mr. EREAUX. I think if there's a way that we can somehow bring more parties together. When I talked to the Public Service Commission about a year ago on ways to solve our problems with telecommunications, in other words, we have what used to be five and now four telcos on the reservation, I said well, can we bring everybody together to try to hammer out a way to fix this. And they said, no, you can't, because that is anti-trust when you do something like that.

So we have a problem. We've got 26 telcos, and we can't bring them together to try to figure out a common solution because it's anti-trust, which I can see that argument.

However, I don't believe, if we can bring all the groups together, the university systems, the state, the rural cooperatives, the independent telephone companies, we can't somehow bring them into a meaningful dialog and solve it as a group, that we're going to be fighting the same battle 5, 10, 15 years from now.

Senator BURNS. Now this is in respect to what? Is that in services offered, or does one's system talk to another system? Give me an idea.

Mr. EREAUX. I think it's both. When we look at the initiatives that are happening in Montana, there's a video initiative on the Highline for video services up there, there's one in the southwestern part of the state, there's one at Mid-Rivers, there is the state video system, so there are, it's going to be a matter of, there are going to be different systems out there that need to communicate together, crossing boundaries to connect those together.

All the video systems out there right now have been private video systems. How do you connect them together without, you either have to run a connection between all of them individually and figure out a way to get a low-cost connection over the carrier, the long-distance carriers.

The problems we've got with the local telcos that have been doing this for years and years seem to be that there hasn't, at least in the telecommunications environment which we're talking about here, networking, video services and a few others, there's a real fear to grab on to newer technology because they're uncertain right now.

It took 3-1/2 years of going to the Public Service Commission, arguing a stack of paper that high to get a telecommunications company to deliver a service they're tariffed for, because they're afraid. They're afraid if they offered that service, then they would somehow go out of business, and I think a lot of the telcos have that fear right now, the fear of competition and what it will do to themselves, to their customers.

Senator BURNS. Kristianne, I was struck by your stats that when we first started the telemedicine project, they thought referrals or one hospital would end up with all the business and this type thing. You are saying that just the opposite is happening?

Ms. WILSON. We track every one of the consultations, whether they're in medicine or in mental health, and these numbers indicate that those patients are staying in their rural communities and keeping their care with their primary physician.

The rural primary care physicians elicit the need for a consultation for a differential diagnosis, a second opinion, getting some specialist information, or for discharge planning, but patients aren't being identified that then subsequently come to a larger center for more definitive care.

So, our precepts about being able to retain more care locally helping stem that unnecessary outmigration, helping to keep that rural health care economy whole, have held true.

Patients are staying in their rural communities. The 5- to 20-minute consultation is allowing that primary care provider to be able to continue to care for that patient.

Senator BURNS. Are we doing mental evaluations now in mental health in distance?

Ms. WILSON. We're doing primarily medication checks for patients who have already been seen by psychiatrists, who are on some sort of medication that need to be reviewed periodically. That's one application in the mental health arena.

The second is discharge planning, patients who have been an inpatient here in Billings and then linking up with their local resources or family to be able to ensure that they get the necessary care once they return home. We are beginning to do initial consultations in mental health to be able to determine, can that care be retained locally.

Senator BURNS. Does anyone in the crowd have any questions for any of our panelists? This is the time for you to get involved and ask some questions that might be concerning you. If you do, step to the microphone, and we will try to address your questions. We will try to get some answers for you. This is an open forum up here.

Step to the microphone. You can address any of the participants.

Mr. MILLS. My name is Norman Mills, I'm a communication engineer.

I would like to just ask you as a group since I've worked in several states, what do you propose by way of legislation to make the application of rules from state to state more uniform, so that as this Network gets through 25, 30 states where everybody wants to talk, so that they are allowed by the state rules to do this and not be hampered by state rules that puts a damper on what they can do and when they could do it and how they could do it, because as I have been an expert witness in many states, their rules are different, their application's different, their philosophy is different.

Senator BURNS. I think in S. 652 there is a section that deals with state exemption, and I think it is pretty much a consensus among the Federal people who are involved in policy that some state exemptions are going to have to happen in order to build the national infrastructure.

Now whether it is worded and whether we have gone far enough in some of those areas, I guess that will be hammered out in conference. Some folks think that we have gone too far. I would say some local entities even as far down as cities and towns think we have gone too far, but I think there is a consensus in the Congress now that in some areas, there has to be state exemptions in order to build a national system; to build a national system and make sure it is deployed in all areas.

Mr. Poulos, you look like you have a comment.

Mr. POULOS. Right. An area that is not addressed in the telecon legislation but is a good example of how a patchwork of laws from state to state could be troublesome to national networks or even global networks, is the issue of privacy, and of course anybody in the health care business understands that issue.

Where you have personally identifiable information about each one of us, about our purchasing habits, our health histories, if you have a patchwork of laws around from state to state and having national global networks where you want to move that data around, could be a real problem. It's an address, it's an area that we're going to have to address in the future.

Mr. IRVING. Let me just follow up on the privacy part. We're doing a study on privacy, and one of the interesting things that I just found out, and I was a little frightened by it, is that if you're on the Internet—and I'm on it all the time—and you use your mouse to click in, there is a record kept. For example, if IBM and I decide I want to look at their Think Pad 701, and I look at the Think Pad 701, and then it refers me to networking, and that refers me to EDS and I click in to EDS, there's a record of all of that kept in the system.

And if somebody wanted to, they could sell that record, and Mr. Poulos could try to recruit me to buy his networking service, or IBM could. And they call it "mouse droppings." [Laughter.] They can literally follow you from place to place.

Mr. POULOS. A new term of art.

Mr. IRVING. It's a little frightening when you're talking about that kind of issue.

But what if I'm going into a health network and I decide I want to look into mental health issues and I spend some time going through depression, and then through drugs for depression, well, do I want a drug company knowing that, or if I'm a public figure do I want, you know, the Washington Post knowing that I'm looking up issues related to mental health issues?

You know, there are a lot of very, very troubling privacy issues that I think all of us need to focus on, and we need a national solution to it. I don't think people out there are necessarily doing it for bad purposes, but it could have harmful effects much like when Judge Bork was up for a nomination and people were selling his video rental history. I don't think any of us want that kind of inspection of our private lives.

There's another problem economically, and that is Europe has very strict privacy laws, and their willingness to deal with networks in the United States will be contingent upon whether or not our privacy laws will protect European citizens who are on the network in America.

So both for national reasons and for international reasons, we have to take a look at privacy laws and do it pretty quickly.

Senator BURNS. Laura?

Ms. FORD. Moving away a little bit from the privacy aspect, I think the concern about "balkanization," as it's sometimes called, or too many different seams in different states and areas is something that we need to be concerned about in building the NII, and we believe that the Senate bill does a better job of addressing that issue than is found in the House bill, in that what it would do is give strong Federal guidance or guidelines, but then flexibility for the states to work within those guidelines and tailor their state plans to address specific state concerns so that you have a balance there.

Senator BURNS. If the panelists want to ask each other questions, that is what I like, I like to start a fight every now and then. I learn more that way than I do any other way, because I overlook some questions.

Yes, ma'am?

Ms. FULTON. The issue of interstate credentialing that Ms. Wilson brought up I thought was an interesting one, because it's also



something that came up in distance learning when you have a teacher in one state being delivered over a system into another state, but doesn't have the credentials to teach in that state. I think there have been a lot of strides, activities that have made it possible now to get over those state credentialing problems in recent years. That was a big barrier in the early years of distance learning, so I hope they won't be barriers for medicine.

Senator BURNS. We looked at a situation in telecommuting. Three years ago I got a little amendment through on the transportation bill to tell the Transportation Department to look into the possibilities of energy savings, highway use, pollution and all this. I live 20 miles outside of Washington in the little town of Springfield. None of them are little, but this is smaller than most.

I-395, I will tell you, every morning from 6 in the morning until 9, is the largest parking lot in the world. What if we didn't have to go in every day? Say a person could stay in, if he had a fax and a computer and a telephone in his home, and he could work at a work station. According to the IRS, and their treatment of that area, can he take that part off of his home maybe, or what do we do about workman's comp and liability?

All this has to be looked at when you start talking about these kind of issues. So they did the study, by the way, and they didn't want to do it. They just beat up on me and everything else for getting it in there. But now, with the savings in fuel and the pressures on our highways, we can't build highways to accommodate all the cars. If you build two more lanes, they buy two more lanes of cars, you know.

I know why Europeans ride trains. It's because they don't build roads, and that's the only way you can get to work primarily. We have to look into those things.

Ms. Wilson, you—

Ms. WILSON. No.

Senator BURNS. You didn't have a comment?

Oak, you got a question?

Mr. KRYZER. Well, you hit upon a very important point in your discussion about doing some work at home. The biggest deterrent to home work is the IRS. As soon as you get the IRS to recognize the ability of people to work at home and approve the necessary deductions pursuant to working at home, will solve a lot of that reluctance to do work at home.

I am a private consultant and I work out of my home. It took me about 10 years before I could convince the IRS that I was a legitimate home office person, and I think the IRS is dead set in their philosophy against people working out of their homes.

Mr. POULOS. Hear, hear.

Senator BURNS. Hear, hear?

Mr. POULOS. Yes, sir.

Senator BURNS. Oak, do you have a question for any of the panelists?

Mr. WINTERS. Well, it's just kind of a statement of affirmation. Is that allowed, Senator?

Senator BURNS. You bet.

Mr. WINTERS. My name is Oak Winters, I'm Dean for Outreach of Montana State University in Bozeman, and we have a project

that is attempting to erase the barriers of the campus and make university services available to rural people using basically the home computer, the lowest common denominator of the lowest cost possible delivery mechanism for educational services.

And I'm struck by a number of the comments today, because it seems that we've, in some ways as educators are our own enemies in the sense that we, first of all, we want a controlled system. There is this desire if we have a project, then we want to create a system around us. A uniquely American kind of response to a problem is either create a committee or an organization for it, or a system.

And I'm struck by Jim Ereaux's and Ms. Fulton's comments that we really have to get out of the business. Those of us who are either educators or medical health care providers, we really have to get out of the business of managing systems. I mean, we're not very effective. We need to be dealing with ways that we can deliver services, programs that people need, not the promise.

And as we work with school districts across the state of Montana, we're seeing this promise made: All we need to do is to get you on the Internet and your problems will be solved; or, let's create a network that where you could share programs, instruction, and your problems will be solved.

Well, oftentimes it's the love of the technology that drives it as opposed to true needs, so I'm hoping Mr. Poulos and others, that as an educator, 1 day soon, that we could get out of the business of trying to create yet another independent network for some specific purpose and develop some strategy where the telcos could work together, the major utilities can work together, and those who want us, those of us who want to use these services can in fact have access—we'd like to think some dial-up access—to a variety of technologies so that we could spend our time—and I'm saying we're the problem here, too, because we spend too much time thinking of the problems that need to be solved through the uses of technology as opposed to creating yet another technological delivery system.

So my question, forgive the long intro, but I do think it's important, because there's a lot of money being wasted in yet another system that somebody has a nifty idea for. How far are we away in a rural state such as Montana to truly have access to a variety of choices?

And so those of us who see ourselves as educators or medical providers or care givers, whatever, in effect focus on what we ought to be doing, that is, the appropriate application of those technologies with our clients to solve some issue or problems as opposed to simply have another system or technology to decorate our store fronts.

If that's a naive question, forgive me, but I think there are a lot of us that need to be spending our time focusing on problem solving as opposed to management of systems.

Senator BURNS. Do you want to tackle that one?

Mr. IRVING. Yes, what I hope is, I have the same desire I think you have. What we're trying to get to as a nation is to make whatever subject you're trying to apply as easy as when you're watching your television, and let me run the analogy out.

When I'm watching my television, I really don't care whether it's a VCR tape, or over-the-air broadcast television, or cable television, or satellite-delivered television or microwave television. What I really care about is the content behind it. The thing that I'm approaching on that television is what I'm really interested in.

If I want educational, if I want education delivered to me or if I want health care provided, I really don't care whether it's a free relay service, or I don't care if it's an EDS-developed system. I'm really not interested in whether or not U.S. West or TCI cable is delivering it to me, what I really want is the ability to pull the power of that information and use it to my benefit.

And that's what we're trying to make the system as—we're trying to make the systems more powerful and more powerful. They're going to require more and more intelligence so the people using it can be dumber and dumber about what's happening in the system and in the network, and it really does require that kind of an analysis.

So I think we're really trying to do that, and I think the only way to do that is to do what the Senator's trying to do, which is break down the competitive barriers, break down the walls, let anybody deliver any service anywhere. And once you get that, they will try to make it easy and user-friendly as possible, because they have the incentive to get it out the door.

I do think that college educators and medical providers will have to worry less about what the system is and more about how to deliver the service they're trying to deliver to the people, because there are people who are very good at developing the systems, that they're not necessarily the educators and the health care providers, there are people who are very good at providing health care and providing educational services, and they just to need to get together and figure this out.

Mr. POULOS. I'd like to just make a comment. I think that was a great question, because it leads to what the telecon bill that is going to be hopefully passed soon, will do, because what the gentleman was talking about is interoperability.

We have all of these technologies out there, the telecommunications technologies, the computing technologies, we have wireless, cellular telephones, but everything doesn't hook up.

I mean, I just got a real nice stereo system for my birthday, and I tried to hook my cable system into the surround sound system, into the large screen TV system, and I had to get my brother, or my son-in-law over, who's an engineer for Mitre, to hook it up. It was a mess.

Senator BURNS. Your kids can do it. [Laughter.]

Mr. POULOS. Yes, sir, you've made a great point about education.

But interoperability, in other words, I think, is going to be driven by competition that's going to be driven by the deregulation which is going to cause "schmooshing" of all these technologies together, and companies like U.S. West and EDS and IBM and Computer Systems Corporation are all going to be out there competing to build the system so one doesn't have to worry about how his information is getting to his students, or how the school is able to provide those services to Montana residents, that, first of all, those in-

stitutions can't keep up with the technology, so they shouldn't try and build their own systems.

What they can best do is make us all compete to provide the architecture and the infrastructure for him to move the information he wants out to the people that need it, and that might be wireless today if that's the best price; it might be cable tomorrow if that's the best price tomorrow. That will change over time.

If he doesn't have to worry about developing those infrastructures, then he can allow us to compete against each other and provide those services to Montanans. I couldn't agree with him more.

Senator BURNS. Yes, sir.

Mr. LUNDIN. My name is Mike Lundin, I'm a professional development person for the systemic initiative for Montana Mathematics and Science.

I would like to appeal for a lobby for the systemic initiatives, and I'm going to do that by way of a poignant story, and I'll try to keep it brief. I'm tickled today, because every once in a while something comes together after a lot of hard work.

We have a wonderful thing happening in Butte, Montana at Margaret Leary School. Some of you remember what happened at Margaret Leary School, or surrounding Margaret Leary. About a year and a half ago, one boy shot and killed another boy, and that was a very poignant tragedy and still lives pretty heavily in Butte.

Well, as a result of that tragedy, the Northwest Regional Laboratories out of Portland placed an Intel video machine in Margaret Leary as part of the Safe Schools Project. Now they were one player in sort of a domino game of players that have happened with regard to an optimistic ending.

When we got word of that at the SIMS project, we were also dabbling in interactive video and had done some courses using some personal video machines, and succeeded in getting into their particular piece of equipment. In fact, this happened 2 days ago after trying for months to do this.

We were delighted, because out of a combination and out of a bunch of players, we could provide a service and a course which is going to involve actually the Sorbonne Institute out of Japan and basically run an advocacy institute into that school.

Now the poignancy here is, of course, OK, something good happened out of something horribly tragic, but also that for a mere pittance as far as funding goes—you can buy this machine for \$4,000, including the Pentium base for it—we can establish communications and begin what amounts to a true world community here in the state.

We have as players the National Science Foundation, which funds my project as well as the STEP project that Margaret Leary is also assigned for, U.S. West and AT&T, which has helped us immeasurably for this, Northwest Regional Labs and the Sorbonne Institute.

This is one example of a tremendous effort by a bunch of people recognizing a perfect place for something good to happen. It can be done, but it takes one, what Mr. Winters said, program evaluation, and just standing back and looking to see what have we got, what can we provide, as well as what we lack in the state in terms of dough.

Every little piece, I've never seen people in a state grub for dough like they do in Montana. If we can get \$4,000 here, \$5,000 there, we're going to make it work for us.

So, I'm appealing for two things; yes, platform programs. We need that. It's time in the state that we look and say, what kind of programs can we sustain, as Mr. Ereaux alluded to. They have to be sustainable. Sustainable programs that are quality programs, and for funding, which is coming so difficult from Washington these days and threatens all the systemic programs now, we still have to have that funding.

I guess I leave with this thought. If we had had that funding, if we had had the connection, maybe we could have brought one kid upward in self-esteem, and then maybe this wouldn't have happened.

Thank you.

Senator BURNS. Thank you very much.

Let me just give you a view. There are differing views, as you can imagine, in the Congress with respect to government funding of projects, especially along technology and sciences. Of course with the grant system, we think the competitive grant system is the proper way to go.

Those systems that, or those projects that have great accountability have always been very, very successful in sustaining their grants and providing moneys for those different projects. I do not see that support waning that much among Congressmen and among Senators. They still think that there has to be a role played in some areas.

I will say, however, that there will be more competition for those dollars as time goes on, but as good ideas come up, we have to help those ideas and just get them started.

Then there are some ideas that take off that require no more funding. I think the corporate people in the United States are taking a vast look at some of these areas and are saying yes, we have a moral responsibility to be a player with respect to different projects. They can also see a future in it for their own corporations, and I think that will continue to be true.

We just have to make it. The only reason that we opened it up in 1989 was it was the only way that we were going to deploy any of the new technologies. We had to deregulate. We had to deregulate to force new technologies into the marketplace, and it's been a long time coming. I have been involved with this thing 5 years now, and you know, I am just smart enough to barely play a radio. My wife does not think so at times, but I know that they are very vital.

I cannot see the decrease in dollars. I think there is an emphasis that we have. It is just a matter of going up and telling the story on Capitol Hill. We have the dollars; sometimes we do not put them in the right priority, in the right priority, but that is happening right now.

I have never seen such a revolution as the one that is going on on the Hill right now as they are trying to reidentify or reexamine what the true role of government is, No. 1, and No. 2, where our priorities really are because we are going to be limited in the amount of dollars that come from Washington, D.C.



Yes, sir, give your name.

Mr. MOSPAN. Mike Mospan, Mr. Chairman, and I'm from Helena, Montana. I'm a member of the MTAC organization, and I'm a retired telecommunications manager, worked for the Federal Government in Washington, D.C.

But on the issue of NII and Mr. Irving's statement that the role of the government essentially should be one of adopting policy and essentially allowing industry or providing the mechanism for industry to build the NII, is there some view as to what the level of magnitude, at least at the government level, the role that policy will play?

I guess where I'm really coming from is if industry essentially lays the foundation, puts the infrastructure in place, is there any concern that the Federal Government may, at some point in time, try to dictate or mandate the operational use, and essentially come up with positions that may be viewed to be taking control of operational responsibilities away from industry?

And when I say "industry," I'm talking about across-the-board in the telecommunications industry, and that's a question, Mr. Chairman, either for yourself or Mr. Irving.

Mr. IRVING. I'll try it real quickly: No. We want a privately built, a privately owned, a privately maintained system. We want more than one system. In those towns that can have four or five or six competitors, they should, which would make it more difficult for the United States government to ever take hold of it.

Here in a city the size of Billings, you will and should have a cable operator, you will and should have a wired telephone operator, you will and should have several cellular phone operators, you will and should have PCS operators, there should be no way that the government could take control of that.

There certainly has to be, in times of national security risk, the ability for the President or the Commander in Chief to talk to the armed forces so that we'll be a network that the government owns and operates for national security reasons, but we have no desire and no opportunity to take over what will probably be several hundred different networks. It will be networks of networks, and there will be no way that anybody could control those networks of networks.

TCI and U.S. West and Bell Atlantic and AT&T and MCI and Sprint are not going to let us co-opt their networks, and we have no way of doing it, and don't want to.

Mr. MOSPAN. Thank you.

Senator BURNS. Yes, ma'am.

By the way, Larry Spencer, who spent quite a lot of time with NASA and works in our office, just handed me a note. Our dollars, our actual research and development dollars in grants, have not gone down that much from one Congress to the other, ever since I have been there.

So I think what we are seeing is you thinking there are probably less dollars. I think you are seeing quite a lot more competition for those dollars.

Yes, ma'am.

Ms. HATCHER. I'm Karen Hatcher, and I'm Dean of Library Services at the University of Montana, but I spent the last 2 days,



Thursday and Friday of last week, being an outside evaluator for a Federal grant that MSU-Billings had received, and this grant was for the formation of Outreach Montana Network Information Consortium, or OMNI as it's known to librarians in the state.

And I visited the two tribal colleges, one community college and one private college along with MSU-Billings library, that are participants in this grant, and I guess I want to give you a practical example of what Mr. Ereaux was talking about, the problems that one has in trying to provide and get private providers together to form a network to provide more library services to the areas of Montana that desperately need this.

These five libraries are getting together, sharing their collection, and the tribal colleges have some very unique collections that all of us need to use, and all but one of the libraries or colleges in the consortium are paying \$80 a month for their telecommunications cost.

The one tribal college is going to have to pay around \$375 a month, and this was after they did get all their participants together, sat down and talked with them, and I think your office, Senator Burns, even tried to help in these negotiations, but it was with a private telco, and they felt they were doing a lot by coming down to that much.

So, I think there's a lot that needs to be done yet in the rural areas to help situations like this, and I just wanted to give you that story.

Senator BURNS. Thank you very much.

Yes, sir, Tom.

Mr. KRYZER. Excuse me for not identifying myself previously. I'm Tom Kryzer. I'm a private consultant for business as an independent entrepreneur.

We talked a lot today about the value of Internet and telecommunications with institutions, colleges, hospital, et cetera, but I don't think we should overlook the value to the independent businessman. I will just give you an analogy.

I had a project about 5 years ago that was a very sophisticated analysis of the conversion of energy, and in Montana, that data was not readily available. So I used to get on a airplane, fly to New York, go through the New York Public Library, go down to D.C. and go through the Library of Congress and any other information that was available to me, and, you know, that doesn't come cheap. Northwest Airlines made more money on this than I did.

Now that is not necessary, and I think this is the thing that ought to be recognized. It's the value of a person sitting in his home office that the IRS doesn't like, here in Billings, tying into any place in the United States or the world, for that matter, to get data that is needed in conducting his business. And I think this is such a vital thing, because we talk about the moving of people in, out of the so-called traditional workplace into the non-traditional workplace, and this facilitates that.

Thank you.

Senator BURNS. You bet. Ms. Fulton, you have an airplane to catch. You want to be excused, well, that is fine. I certainly appreciate you coming today, and I feel very sorry for you going back there. We will do our best to survive out here.

Ms. FULTON. But we need you back there, too.

Senator BURNS. OK, thank you very much.

That is a good point. You know, I want to bring up that I have a daughter who is at University of Washington in medical school. She is in the WAMI program. The best investment I ever made in my life was her computer because she accesses. They do not go to libraries anymore. They do it from their apartments. She accesses John's Hopkins, UCLA and the University of Washington.

I can't believe that in another year I am going to have to call her Doctor, which just blows my mind, knowing her, of course.

But you are exactly right. The application, the business application is going to get bigger and bigger.

Bill?

Mr. POULOS. There have been two questions that cause me to bring up the next subject, and it has to do with libraries being able to get information out to people and schools who need information from libraries, and students need information from libraries, and many schools have libraries.

It's the issue of intellectual property. There's a law or a doctrine called Fair Use which provides the rules by which schools and libraries can have access to information that they would normally have to pay for by going to the book store and buying a book and paying the full price.

Secretary Ron Brown has launched, gosh, it's a multi-year effort to try and sort through how we have to change the law in the future so that we, so that people who invent things, write books, write movies, write music, all of these things that are going to be moving around the country on this NII and GII, they have to continue to be assured that they're going to be paid for their work, and that is, of course, provided for in the Constitution.

But at the same time with the digitization of information, a library may have originally had 3 paper copies of a book, but if 10,000 students all reach for that book through some digital network, when do their fair use rights end. This is an area that's going to require some attention in the future to ensure that students and education institutions and non-profits all have the access they need.

I might say that Secretary Brown has just released a White Paper on this issue which is quite good and is being viewed very positively by industry, and it's an area where the government and industry is working very nicely together.

Senator BURNS. I think, Bill, that we talked about this the other day just in our little circle at work, and the future is now. I think we are going to have to address that. I do not think we have much time left. It is moving too fast.

Mr. Lark, Lewistown, Montana, KXLO radio, the voice of Fergus County.

Mr. LARK. Thank you very much, Senator.

I have several issues that I would just like to bring up, and maybe, Mr. Irving, you can address these for me, or Senator IF YOU COULD.

First of all, the coming on to the fore is satellite cellular communications. The American Mobile Satellite Corporation along with

Hughes and several other communications giants have certainly launched this satellite. It's in the alpha and beta testing right now.

It's proving very successful, and with satellite cellular usage coming to be offered to the public in December or in the forefront of the next year, in January, do you see where that might place, where will that be placed within the spectrum of rules and regulations of security and all the other aspects that go into basic flow of communications off of satellite cellular? Do you see anything?

Mr. IRVING. No, we'll likely treat satellite cellular as we do almost any other communications service; we certainly want to make sure that peoples' privacy is protected, and we want to make sure that there's not an ability for people to steal communications. But that's basically it. One of the things that I've discovered in 15 years of doing telecommunications policy, is that you can't hold back a technology. The best thing you can do is let the marketplace decide and let those people who are investing in a technology do the things they need to do to make sure the consumers want to consume that commodity.

If they don't want to consume it, it will wind up like the Betamax. If they do want to consume it, then it will wind up like VHS. It really comes down, we believe, to the marketers and the people who are investing in it, and government should do only those things we need to protect against abuses, either anti-competitive abuses or security or privacy abuses.

Senator BURNS. Fred, let me put a footnote that your question, I think, would be better directed toward Mr. Hunt. You know, I think the FCC will be charged with making some of those decisions as far as satellite telecommunications.

Mr. LARK. OK.

Senator BURNS. Congress has not decided to take it up.

Mr. LARK. What about the tremendous advancement of GPS, the global positioning system, especially outside of the military with use for commercial aviation as well as general aviation? And this would be GPS which basically could be worldwide with the navigational aspects that we're dealing with now.

Do you see that rapidly moving forward?

Mr. IRVING. Yes, and we're trying to promote that by ensuring there's adequate spectrum for that.

There are a couple of different uses for GPS. It started out, as you know, as defense technology, and you needed something the size of a suitcase to use it. Now you can go hiking and put something about the size of a compass in your pocket and have GPS capabilities. We certainly want to facilitate this technology.

In addition, a lot of people don't know that GPS will likely be the technology we use in this country for low-visibility flight landings. In order for the FAA to do that, they're going to need adequate spectrum.

One of my jobs in Washington is to make sure that Federal Government spectrum users have the spectrum they need. So as we transition from existing navigation technologies and move toward GPS in both domestic and global system, which will be a better system and will save lives, we just want to make sure that there is sufficient spectrum for the technology to work.

But again, the market is driving that. Delta and Northwest and American are going to spend a lot more money in developing and deployment of technology than the FAA is.

Certainly, the initial investment of the Defense Department in the FAA has been helpful, but now we're going to let the private sector in with regard to navigation, and the private sector in with regard to hiking. I go hiking up in the Shenandoah and Blue Ridge Mountains. I'm looking forward to the day my wife and I can go up there and know if we get lost or stuck, we have this little device, and I'll have my cell phone in one hand and I'll have my GPS in the other hand to reach help.

Senator BURNS. Listen, I will tell you, Fred, you know you are closer to that issue than you think you are. Do you realize that we have a great project at Montana State University through NASA? I visited Langley to see the research they are doing down there on zero visibility and zero ceiling.

There are two or three projects. Geo-Research here in Billings is doing work on GPS and the advanced stages of GPS for NASA. The research, you are closer to it than you think you are. Just go over to Bozeman. Larry, you can bring him up, because it is ongoing and it is high priority.

It is a wonderful system. It is nice. You know what? We flew on this trip to Russia. We really ought to think about putting that system on airplanes that the Air Force is flying. The research and the development on it is on track and being done by, mostly by NASA, but they are over at Montana State.

Mr. LARK. The reason I brought those two items up on satellite cellular and GPS is because of the policy now that is really dealt with in commercial airlines, when you board a commercial airliner, they ask you to turn off your computer. They ask you to turn off your cellular phone. And I think we know why, or most of us, some of us know why they really want you to turn off the cellular phone, because you can't bill it if you're at 40,000 feet and you collect all the cells that you're flying over. You can't bill the guy, but they require you to turn your phone off now.

What I'm asking here is, the rules and regulations, on GPS navigation with satellite cellular usage on a phone, will you be at liberty, or will the GTEs of the world still put the hammer over your head, and you're going to have to use that phone before you get on a commercial airline?

Mr. IRVING. Can I try that?

Senator BURNS. Yes.

Mr. IRVING. I've flown 430,000 miles since June 1993, so I fly a lot. And I have friends who are pilots, and I understand the DTE point. I have a little compact CD player because I want to play my music as I'm flying back and forth.

There is a mixed question as to the affect of those radio-emitting devices on the navigational devices in the cockpit, and until they have a clear answer one way or the other, while I'm flying 200,000 miles plus, I'm comfortable turning off anything that emits radio signals. [Laughter.]

And while I understand your point, I want somebody to give me a clear answer that any of my pilot friends haven't been able to give me so far as to whether or not it affects or doesn't affect navi-

gation. If we can find it doesn't, then I think people should be free to use these devices, but no one I know can give a dispositive answer one way or the other.

I do think that there may be some excessive caution with regard to cell phones throughout the entirety of the flight, but I also know that there are some questions about landings and take-offs, and, you know, I have literally watched people not put their cell phones away, and I want to go over there and kick them. It's your life and my life, buddy, put the doggone thing away.

Mr. LARK. I just have one other item here. With the project you've been working on, Senator, for several years now, you've been involved in this with the Senate, and I know you and I talked about it even prior to that time about telecommunications and the advancement thereof.

Where or how are you—or is this going to be strictly commercially driven for commercial media, radio and television? Where does this fit into this spectrum?

Senator BURNS. I do not know where you are driving.

Mr. LARK. Super stations off satellites, which we're already experiencing, several other clandestine radio stations that are already transmitting, how is this going to flow into the information system under your information highway?

Senator BURNS. Well, Fred, I don't know how to answer that for a simple reason. I guess your direct broadcast is going to be assigned a spectrum, and of course we had a little fight on the floor about that the other day. Also, new spectrum that will be released will be sold at auction.

I do not think how you operate your FM or your AM stations, or how it flows into the cable systems now—I think everything that is up on the satellite or anything that is produced on ground or for cable has access to all cables if the cables want to give it access.

Mr. LARK. Yeah, I think so.

Senator BURNS. I think that is the spirit of competition. I think it will all be competitive, very competitive.

Mr. LARK. Thank you very much.

Senator BURNS. You bet. One last question.

Mr. COCHRANE. My name is Bill Cochrane, and I'm the director of the public library here in Billings, serving Billings and Yellowstone County.

I'm one of several people in the room who have been appointed to serve on the Governor's Blue Ribbon Telecommunications Task Force, which will be addressing what you were talking about, what is government's role in future telecommunications for our state.

I was intrigued by the Secretary's report that there is an acknowledgement that the market will fail in parts over much of Montana, an acknowledgement by other panelists. We didn't get beyond that into what should be the Federal and the state role in meeting those market failures, what kind of regulatory environment you envision at either the Federal or state level.

On behalf of my colleagues in libraries in the state, I guess I would like to express our support for the Snowe—

Rockefeller provisions that others have spoken to, but anybody who would like to speak what should the Federal and state roles



be, regulatory legislative rules that would help us on the task force address the market failures in Montana, we would appreciate it.

Senator BURNS. As we move into a deregulatory era, Mr. Cochrane, in order to provide some competition in the market, I think we will find there will be some areas where there are some failures. That will probably start the debate again for some regulatory reform in order to get those areas served.

I think we should let this shake out and see just exactly what happens. I do not think anybody has a clear picture out there about whether the state of Montana, having only 850,000 people and covering 148,000 square miles, is destined to failure. We do not know that.

In the long-distance area, does anybody in this room know how many long-distance carriers there are in the state of Montana?

Audience Participant: About 50.

Senator BURNS. 50, and they are all making their little living. Now I do not know whether all of them are making a living or not, but they are very competitive. Now, who would believe that there would be that many long-distance carriers in the state of Montana?

So, when that was deregulated, and we got MCI, we saw them because they were big, and the Sprints, and of course AT&T, but there are a lot of long-distance carriers out there that are competing very well in the marketplace.

Sometimes we just do not shop around, like for your library. You know, when the question of the library came up,

I think it was our amendments and funding on the Library of Congress, we had to force the Library of Congress to do some things different, force them to spend some money so that they could do some things electronically, and so that they could access. I think, Bill, you probably remember, that was about three or 4 years ago on Appropriations. We said now, Dr. Bellington, you have to start doing some things, so that we can move some information out of here.

So, we think the competition is out there. Sometimes the people who want it do not have access to how many companies are out there and where to go for their services, but we know there are a lot of them out here in Montana.

So, there will be some changes. If some areas are destined to fail, I think then there will be a policy change to make sure that those areas are adequately served. That is one thing that we have noted in telecommunications policy, and it is why the dereg and why we think distance and those kind of projects are very important.

Not only did I realize this for Montana, because we have a lot of dirt between lightbulbs. We also looked at the inner cities because of a declining tax base and as a way to stimulate young people, maybe not in program content but in the technologies that gets it there in order to break those barriers that they have now and offer them some opportunities, just like we have to offer opportunities for people who live in rural areas.

That is what has been driving this whole, the whole discourse; so I think as time goes along, we will open the market. I think there will be some places that will fail either at the state or at the Federal level. Some state policy changes will be made in order to make sure those areas are served. I think our natural leanings are



to take care of the underserved areas. We know in the populated areas that those areas will be served and served very adequately through competition.

You can offer your comments to us any time you want. I appreciate the panelists coming today, especially Mr. Irving, and all of you taking time out on a Sunday afternoon to have this. It has been a great discussion today. It was a discussion here in my state of Montana, it was a discussion that we had to have in order to understand it. It is the most complex but most exciting area of America today.

So these records will stay open for a couple of weeks, 2 weeks, and if you want to offer comments, we will sure take your comments and make sure they are made part of the record.

So as of now, this hearing is closed, and thank you very much. [Whereupon, at 4:35 p.m., the hearing was adjourned.]



20-632 - 96 (80)

ISBN 0-16-052377-X



9 780160 523779

90000